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In this issue . . .

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The Price of Silver

SHOULD silver be regarded primarily as a precious metal suitable for coinage or an an industrial raw material? The answer to this question will help the U.S. Government to decide whether to allow the value of this essential commodity to float with world demand or whether, like a monetary Canute, to go on maintaining the present price regardless of the economic tide—as in the case of gold.

Recently, the price of forward silver in London rose to 80$\frac{7}{8}$d. per oz., its highest point since the Suez crisis of five years ago. The reasons for the upward pressure on prices were set out in our issue of March 10, 1961, p. 257. In a few words, the consumption of silver for industrial uses, the arts, and to a lesser extent coinage is outrunning world production. The deficiency has been met from the U.S. stockpile, from scrap, and to some extent from secondary metal. Another large source of supply, exclusively for American domestic use, has been the U.S. Treasury's "free" silver reserves, which, however, are rapidly dwindling.

Stocks of silver in the possession of the U.S. Treasury amount to as much as 1,900,000,000 oz., but these reserves fall into three different categories. More than 1,700,000,000 oz. are retained in the form of bars as legal backing for "silver-certificates" to the value of $2,100,000,000, which represent 7 per cent of the value of all the nation's currency outstanding. For monetary purposes 0.77 oz. of silver is valued at $1 and each dollar in silver certificates must accordingly be backed by this quantity of silver. Secondly, nearly 107,000,000 oz. of silver in the form of coined silver dollars is kept by the Treasury as a supply for people wishing to exercise their rights to exchange silver certificates for actual metal. Finally, there is the supply of "free" silver which the Treasury can sell to private buyers or which can be used by the Government itself as an ingredient for coins.

Since 1946, it has been obligatory for the U.S. Treasury to buy newly-mined silver from producers at 90.5c. an ounce and to make silver available to domestic consumers from its "free" stock at $0.91 per oz. delivered at the San Francisco Mint. The effect of this legislation has been to stabilise the price of silver, not only in the United States itself but in the principal open markets of the world, where the average price has tended to fluctuate within a narrow range close to the U.S. fixed prices. The buying and selling policy of the Bank of Mexico, representing the world's largest silver producing country, has been another stabilising factor.

At the beginning of 1959 the U.S. Treasury held 202,000,000 oz. of "free" silver, but during that year a strike at silver refineries had the two-fold effect of reducing the amount of newly-mined silver offered to the Treasury by producers and causing a run on the Treasury's supply of "free" silver. By the end of the year the "free" silver stock had fallen to 175,000,000 oz. and the down trend has since gathered further momentum. On January 1, 1961, only 124,000,000 oz. remained; today there are less than 54,000,000 oz., equivalent to about six months' supply at the current rate of usage.

Despite the growing gap between consumption and production

of new metal, there is no overall shortage of silver in the world, as Handy and Harman have pointed out (*The Mining Journal*, July 21, 1961, p. 73), bearing in mind that, historically, there have always been secondary sources of silver becoming available at different price levels. So far as new metal is concerned, a higher price for silver would not be a major factor in increasing production, since well over half the world output is obtained as a by-product of base metal mining, but it would tap immense quantities of secondary silver in the form of coinage or hoarded metal. Already this year sales of Chinese silver on the London market have more than doubled the total of 10,000,000 oz. supplied in 1960, this increase being due, however, not so much to price considerations as to China's need for foreign exchange to finance imports of grain.

There can be little doubt that, once the U.S. Treasury's "free" stock is exhausted, higher silver prices can be expected. The prices at which the U.S. Government must buy new metal from producers and sell "free" silver to consumers were fixed some fifteen years ago and are obviously quite unrealistic by present-day monetary standards. In order to increase these prices, however, the 1946 Act would have to be repealed or amended by Congress at its next session, by which time all or most of the remaining stock may well have been disposed of at the present "bargain basement" terms.

Meanwhile, the "free" silver stock is rapidly approaching exhaustion and the Government is turning its attention to what is essentially a long-term problem of supply and demand. The main objection to letting the price of silver find its own level is that such a policy would benefit Communist China, as a major exporter of demonetised silver. On the other hand, a rise in the price of silver would also benefit silver and base metal producers in the United States itself as well as in other Free World countries which, for political reasons, Uncle Sam is anxious to assist.

As a possible alternative, the Administration might try to persuade Congress to sanction releases from its main silver stock, while the high-cost domestic producers might be encouraged by a system of subsidies to resume production. Such a policy, however, seems unlikely to provide an adequate solution to the long-term problem and might well be rejected by Congress as being too expensive. Between the two extremes of a free silver market and maintenance of the present price, there would no doubt be scope for a compromise solution, involving a higher silver price, which the U.S. authorities might be driven reluctantly to adopt.

As silver's "moment of truth" approaches, the Administration has embarked upon a broad study as a basis for a positive policy, possibly involving recommendations to Congress for changes in the legislation. As part of this study a meeting was recently held between Treasury officials and representatives of domestic producers and consumers of silver, whose views are diametrically opposed.

There are some 25 important silver-producing companies in the United States, most of whom recover the precious metal as a by-product from the mining of copper, lead, zinc and gold. They maintain that new silver output has been discouraged by the low prices prevailing in recent years, as indicated by its decline from 71,000,000 oz. in 1937 to around 31,000,000 oz. in 1960. In order to bring about an immediate rise in the market price, producers have been urging the Treasury to stop the sale of "free" silver before the stock runs out. Consumers, however, contend that the Treasury should go on selling until the supply is exhausted. They say that they would expand their operations to use more silver, but are prevented from doing so by the uncertainties of a rising market and by U.S. Government buying from producers which, they state, puts a floor under silver prices.

Further complications are presented by the problem of Treasury coinage consumption, which accounts for 40,000,000 oz. of the total of 140,000,000 oz. consumed annually in the U.S. Silver producers maintain that if sales were stopped immediately, the remaining 54,000,000 oz. would support the Mint's needs for more than a year, after which the Treasury could obtain its requirements on the open market. The Silver Users' Association, on its part, points out that on August 31, some $624,000,000 of the $2,100,000,000 of silver certificates outstanding were in denominations of $5 and $10. It suggests that if these higher-value bills could be retired by the Treasury and replaced by expanding the existing sets of Federal Reserve notes of the same denominations, the silver bars so released would amount to nearly 500,000,000 oz., which would be sufficient to keep the Mint's coin plants in operation for ten years. This too, would require changes in the legislation.

On the subject of currency backing, producers take the view that monetary silver should be used as a "stiffener" of the dollar's value, in which connection it is pointed out that a modern silver certificate now has more real value than a Federal Reserve note. Producers also recall the important role played by silver during World War II as a medium of economic aid to other countries—a need which might recur. Finally, they maintain that because of its strategic importance as a key industrial commodity, silver should be stockpiled like other essential metals.

Outside the United States there appears to be growing support for the belief that, whatever the outcome of the U.S. Government's study, a decisive turn in silver's fortunes may not be long delayed. Indicative of the present trend of world opinion is the increased tempo of silver futures trading in Montreal. In the period September 25 to October 2 inclusive, no fewer than 37 contracts totalling about 370,000 oz. were traded in the Canadian Stock Exchange, this being by far the best week since the start of trading early in the current year.

CLOUDED HORIZONS FOR LEAD AND ZINC

The market's initial reaction to the communiqué issued by the Lead-Zinc Study Group after its meeting a few days ago was reflected by a fall of £1 in the price of lead and 5s. in that of zinc. A week's reflection has not lead to a more encouraging assessment of the lead situation, but at the time of writing the price of zinc is a few shillings harder.

So far as lead is concerned, it is certainly difficult to discern any cheer in the short-term horizon. Lead mine production this year is expected to amount to 1,747,000 tonnes (metal content) and lead metal consumption to 2,292,000 tonnes. New supplies of lead metal (including metal production, net imports from the centrally-planned economies and changes in non-commercial stockpiles) were expected to amount to 2,365,000,000 tonnes. These figures indicate a probable surplus in 1961 of 73,000 tonnes as compared with the earlier estimate of 50,000 tonnes announced after the Group's session in Mexico City. The higher surplus now anticipated appears to have been due largely to the failure of some countries to implement fully their undertakings to limit supplies, but another factor has been an increase in exports from the Soviet bloc to Western countries, which for the whole of 1961 are likely to exceed 50,000 tonnes.

Particularly disquieting is the fact that, far from the more drastic cutbacks which are clearly necessary to achieve a balance between supply and demand during the coming year, it seems doubtful how much longer the faithful few—understandably disgruntled at having to carry the major part of the burden—will be prepared to persevere

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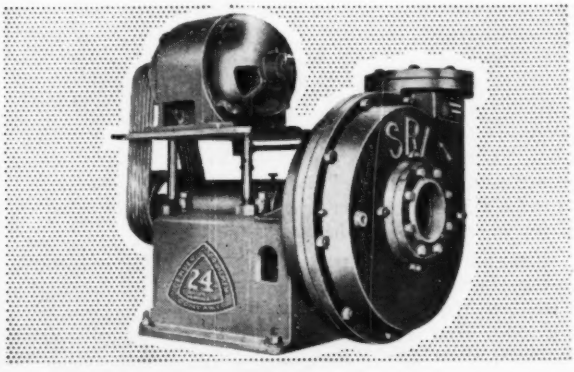

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with the existing cuts. For the time being Canada and Australia are bound by the undertakings made to the United States in connection with the barter transactions finalized a few weeks ago (which have brought about a welcome transformation in the stock position outside the United States), and it would appear to be largely for this reason that the Study Group expects an approximate balance between demand and new supply through the first quarter. Before the end of the quarter the Group will review the position further, but if producers themselves are no longer prepared to co-operate in the voluntary restriction of supplies, they cannot be compelled to do so. One can only hope that, as zero hour approaches, the potential consequences of reverting to uncontrolled competition will induce some second thoughts.

As regards zinc, the Study Group now estimates that for 1961 mine production will amount to 2,630,000 tonnes (metal content), metal supplies to 2,656,000 tonnes, and metal consumption to 2,596,000 tons. For 1962, production and consumption are both expected to rise by about the same amount as in 1961, and it is anticipated that new supplies and consumption will be in approximate balance in the first half of next year.

This prediction, however, even if it does not prove oversanguine, becomes less reassuring when it is borne in mind that the United States is effectively insulated from other Free World markets by its quota restrictions on imported metal. In America itself the outlook for zinc is becoming notably brighter. In the long-term, rising U.S. consumption will obviously contribute to an improvement in the overall statistical picture. Meanwhile the outlook for the motor industry in Britain and the levelling off in economic expansion in other Free World countries scarcely seems, on the face of it, to add up to an improvement in zinc consumption. Moreover, Soviet exports during the current year are expected to be in the region of 90,000 tons, a figure considerably in excess of earlier estimates. At the present time there are certainly ample supplies of zinc about, with ordinary high grade metal from Soviet bloc countries available at a discount on c.i.f. terms to the London market quotation.

The Study Group's apparent inability to take effective action on lead and its seeming reluctance to grapple with the problems of zinc must be regarded as an undoubted setback to the hopes that producers would be capable of putting their own houses in order by agreed cutbacks, a policy which has been adopted with considerable success in the case of copper. In view of the failure to achieve sufficient support for the voluntary restrictions, it is perhaps not surprising that no mention is made among the immediate subjects proposed for study by the special Working Group, of the far more ambitious project of an international commodity agreement for lead and zinc, such as was at one time mooted.

ILLEGAL DIAMOND MINING

Illegal diamond mining and smuggling, with their concomitant rackets, reached such proportions in West and Central Africa during the fifties as to become a major industry, causing heavy losses to legitimate producers and depriving the Governments concerned of immense sums of revenue.

The magnitude of the problem is strikingly indicated by the experience of the Central African Republic (formerly Oubangui Chari), which recently acquired its independence. Production figures, which were 87,000 ct. in 1959, fell last year to 70,000 ct. According to a recent report, this was mainly due to the chaos which succeeded the tightly controlled production by French technicians, when most of these were replaced by Africans with little or no training. In addition, illegal mining and trading were carried on by itinerant Sudanese and Cameroun nationals. In agreement with the French companies, who are the principal legal producers, the Government decided to declare an amnesty for the illicit miners and bought whatever they had in hand with the intention of building up a nationally owned stock. Although the results of this action appear to have been disappointing, some improvement in production was recorded for the first eight months of the current year, when output totalled 65,000 ct. against 52,000 ct. in the same period of 1960.

Guinea was also faced with the problems of illicit diamond buying when it became independent in October, 1958, and the Government took prompt steps to bring the situation under control, among them being the abolition of "Bekima", an African co-operative whose sales in 1958, all through illegal channels, were estimated at 75,000 ct. Such measures were in all probability the main reason for an increase of over 500 per cent in Guinea's (legal) diamond production!

In Sierra Leone, the introduction of more severe prison sentences and a stronger police force to enforce the law in the diamond areas has gone far to curb the lawlessness that was rife towards the end of 1958. Last year there was less illicit mining in the concessions of Sierra Leone Selection Trust than at any time since 1951. It would appear, however, that the situation still gives no cause for complacency, for the Sierra Leone authorities are at present having discussions with the diamond companies with a view to tightening control over illegal operators.

In general, it can be said that the governments of most diamond producing countries in West Africa have done much to curb illegal diamond production. Though some West African figures are apt to be difficult to interpret, it seems fairly certain that in most cases the proportion of output going through illicit sources is decreasing.

ELECTRO-THERMAL ROCK BREAKING

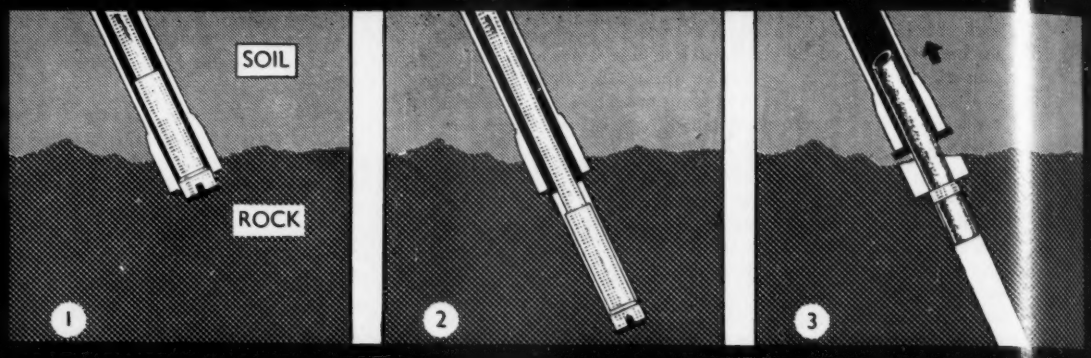
Radio frequency power has been successfully applied to the breaking of rock specimens on a laboratory scale both in Russia and in the U.S. over the past three years.

Reports have indicated the use of frequency from I mc/s to 3,000 mc/s and power from 2½ to 25 kW., break-up of test specimens being attributed to a variety of physical phenomena. To date, however, commercial equipment utilizing any of the effects so far discovered has been conspicuous by its absence, though the potential benefits accruing from the elimination of drilling and blasting to any appreciable extent would assure immediate and universal acclaim for apparatus which was effective, portable and safe.

The U.S. General Electric Co. now announces that in collaboration with the Montana School of Mines, a method of breaking rock has been developed which is likely to lead to the production of commercial equipment.

Known as Electro-Thermal Forcing the method involves the clamping of electrodes to the rock and connection of them to a source of high energy (25 kW.) radio frequency power. This creates a current conducting path through water trapped in the crystalline structure of the rock. Once established, this path greatly decreases the internal resistivity of the rock, making it possible to pass high energy direct current power between the electrodes. This current produces intense local heating and the rock expands and fails due to differential thermal effects. Although less power is required to break metal-bearing ores because of their lower initial resistance, the process is said to work with rocks such as granite, which are normally considered non-conductors.

THE OVERBURDEN DRILLING METHOD



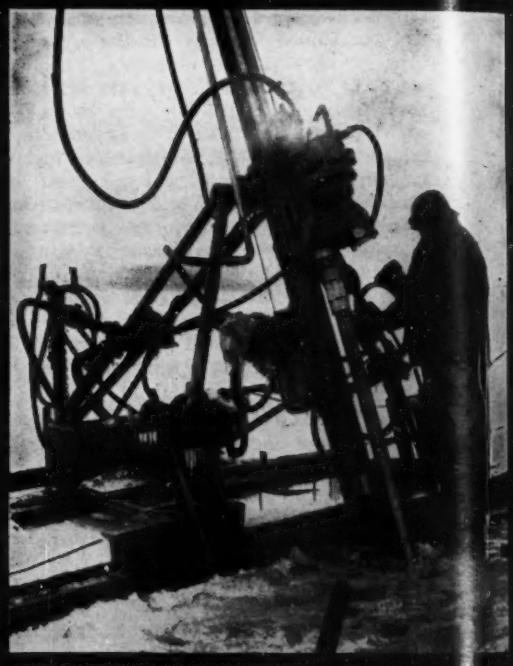
Drilling and blasting bed rock without removing the soil cap

Drilling is carried out using an Atlas Copco rock drill with separate rotation. Extension equipment (left) consists of Sandvik Coromant drill-pipes with ring bit and inner extension steels with cross bit. The bits are tipped with tungsten-carbide inserts.

1. Pipe and steel are drilled simultaneously through sub-soil layers until pipe is collared a few inches in bed-rock.

2. Pipe is uncoupled from drilling action and hole drilled to full depth by inner extension steels alone.

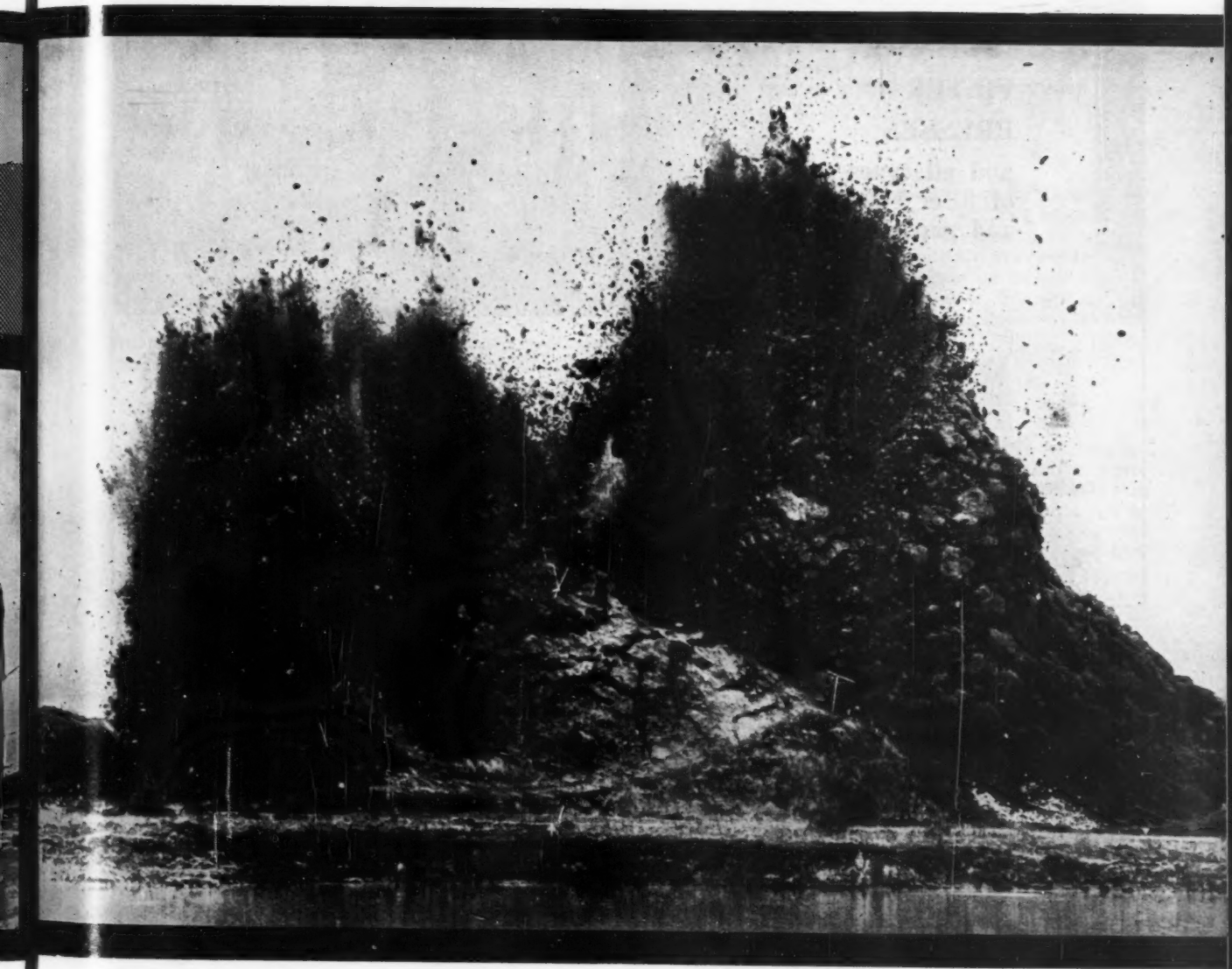
3. Inner steel is withdrawn and replaced by plastic tube. Drill-pipe is removed leaving expendable tube connection between surface and rock for charging.



NEW TECHNIQUE WIDENS SCOPE FOR SUB-SOIL AND UNDER-WATER DRILLING

The Overburden Drilling Method is a completely new technique for drilling through earth strata and under water. It has proved itself simpler, cheaper and more versatile than conventional methods used for grouting, sub-soil exploration, mineral prospecting and similar operations. Underlying boulders are drilled through and reamed without need for blasting or removal. Sampling can be carried out at any stage of the drilling.

The method involves the use of specially developed extension drill-pipes with inner extension steels. These are driven by the Atlas Copco BBE rock drill with separate rotation. By means of a special shank adaptor, percussion and powerful torque are conveyed to the pipe which can be uncoupled from the drilling action. Removal of the inner steels from the pipe leaves an open connection with the surface and widens the scope for a variety of applications.



Overburden Drilling was originally introduced by Sweden's largest contracting company, AB Skånska Cementgjuteriet, for their Lindö Canal project. In constructing this 4-mile seaway to the Baltic about 226,000 cu. yds. of rock and more than 4,500,000 cu. yds. of overburden were blasted and excavated by dredging.

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Metallogenic Provinces in Canada

A TENDENCY for certain metals or minerals to be confined to, or to be most abundant in, particular regions has long been noted by students of mineral deposits in various countries. Belief that such distributions are not mere accidents of prospecting led to the concept of " provinces " called metallogenic or analogous names. Some writers use the term "province" for fairly small areas, and at the other extreme some use it for such vast divisions as Precambrian shields and the stable regions of continents.

Several greatly different theories have been advanced to explain the diversity in the distribution of metals or minerals. Most are in one of the following categories: (1) that the distribution of elements in the original crust of the earth was sufficiently different to account for the present observations; (2) that certain elements may have become available in the deeper parts of the crust at certain times as a result of some process such as atomic transformation, and that a relationship between such times and those of tectonic disturbance might exist; (3) that certain metals are associated with specific kinds of igneous rocks, such rocks being more abundant in certain regions; (4) that the distribution of metals at and near the surface of a region is related to the geological history of the region, which determines such factors as suitable environment for sedimentary or igneous processes of concentration, tectonic features, and depth of erosion.

In Canada, differences have been recognised for many years between the mineral deposits found in certain large geological regions. Until quite recently, however, except for important pioneer work in part of the North-West Territories by A. W. Joliffe in 1952 and C. S. Lord in 1951, little was done to outline or describe areas as metallogenic provinces or sub-provinces.

Series of Maps

A few years ago the Geological Survey of Canada began planning work specifically designed to clarify and augment knowledge of Canadian metallogenic provinces. It was believed that any advances made would have a practical application in the selection of areas for prospecting or for the study of mineral deposits, as well as having a possible academic value. The Survey had to decide whether it would be best to begin with a small area that showed evidence of being a distinct metallogenic unit and to study and sample it intensively, or to begin by assembling available data on a country-wide scale. This question was settled for the time being by a request from the International Geological Congress that certain data be compiled for a metallogenic map of the world. To obtain suggestions as to what might be included in this map and how it might be depicted, each country was asked to compile a map for iron deposits and a composite one showing producing deposits of all metals and minerals in its territory.

It was originally intended that, after publication of maps for individual metals, a "composite" map should be prepared, its purpose being to judge the degree to which the concept of metallogenic provinces based on several metals was applicable to Canada. Circumstances made it possible, however, for a "reconnaissance" to be undertaken by A. H. Lang and it was decided to publish the resulting maps in advance of those for individual metals. They have accordingly been issued by the Geological Survey of Canada, Department of Mines and Technical Surveys, as Paper 60-33, *A Preliminary Study of Canadian Metallogenic Provinces.*

Lang emphasises that the data on which the study is based depend on the degree of prospecting in various parts of the country, and in some instances on the extent to which discoveries were reported and the thoroughness with which the literature was searched; these are believed to have been sufficiently complete in most places to foreshadow actual conditions.

Conc'usions

The three main metalliferous regions in Canada—the Canadian Shield, Western Cordillera and Appalachian region—are considerably alike with regard to the presence of metals; the differences are chiefly in size of deposits. Of the major metals, nickel and uranium are the only ones not mined significantly in all three regions. Iron and gold are more widespread than other major metals, but uranium, copper, lead, zinc and nickel are fairly abundant. A tabulation of minor metals showed that, although all are not mined in all three regions and some are not mined anywhere in Canada, most are found in at least small amounts in all three regions.

The distribution of occurrences within the main regions seems to corroborate the concept that metallogenic provinces and sub-provinces may or may not correspond to geological provinces and sub-provinces. In the northwestern part of the Shield, additional finds corroborate the metallogenic sub-provinces suggested by Joliffe and their relation to the geological sub-provinces outlined by him. For the rest of the Shield and for the Cordillera there is correspondence to geological sub-provinces in some instances and lack of it in others. In some districts there is marked agreement between metalliferous belts and belts of certain kinds of rocks, or of faulting, for areas smaller than most sub-provinces as designated in Lang's study.

The accumulated evidence seems to indicate that in many places the presence or lack of metals can be explained by orogenic history and the amount of subsequent erosion. The relative lack of metalliferous occurrences in the plains and lowlands is a superficial feature, for the Shield continues beneath them. It appears probable, however, that factors other than geological history account in part for the distribution. For example, original differences in the metal content of the crust seem the most plausible explanations for the metallised areas that cross well-defined geological provinces or sub-provinces; for the large concentrations of metals in the Sudbury, Porcupine and other great camps; and for the association of niobium and tantalum in the Yellowknife sub-province in contrast to other regions containing niobium occurrences where little tantalum is known. A point that may be significant when considering the original distribution of metals in the crust is that metals have been shifted laterally to some extent during geological time by transport in solution or as mineral or rock particles.

Lang considers that special studies might be directed both to detailed work in selected areas and also, from time to time, to assembling data on a nation-wide scale to form maps for individual metals as well as for composite maps. It would be desirable to attempt, at least for selected areas, studies that include data on the following: metals occurring in small or geochemical amounts; the distribution of various classes of deposits; kinds of related rocks; and mineral or elemental associations, to learn the extent to which titanium, vanadium, selenium, tellurium, etc., are characteristic of deposits of iron, copper, gold, etc., in some areas.

Commonwealth Conference—XIII

The Benefits of the Contract System in Dr

The article appearing herewith is condensed from a paper by the staff of Boart and Hard Metal Products South Africa Ltd. presented at The Seventh Commonwealth Mining and Metallurgical Congress convened in Southern Africa. This concludes the series in which papers of particular interest are offered in abridged form

IN Southern Africa for the past seventy years, surface drilling has been taking place and it is estimated that 75 per cent of the footage has been drilled on a price-per-foot contract basis.

At present 107 large surface exploratory drills are being operated by the four major contracting companies, i.e.

Republic of South Africa	*Rhodesias*
83	24

Most of these are capable of drilling holes to depths of 10,000 ft., a fair performance being 1,000 ft. per month at a cost of approximately £2 10s. 0d. per ft. in the Union and somewhat higher in the Rhodesias.

The majority of holes are completed to final depth B size (2$\frac{1}{4}$ in. dia.) giving a core of 1$\frac{1}{8}$ in. dia. On average these prospecting holes would be drilled to at least 6,000 ft. depending on locality. The potential of deep hole machines could be 1,250,000 ft. per annum.

Broadly speaking, there are three ways by which surface drilling can be undertaken — departmentally by a company or a group of companies, by a contractor on a cost-plus system of payment, or by a contractor on a contract price-per-foot.

Contract Drilling—Pros and Cons

ONLY a decade ago, the contract system applied to drilling within the mining industry was almost entirely confined to the hire of plant and personnel for exploratory work with the diamond drill, largely on surface and often in remote areas. Since then the scope of contract work has widened, particularly in Southern Africa, to include development cover drilling and grouting, also the pre-grouting of shaft sites. A new departure has been the adoption of a contract system for the purchase of TC-tipped steel and of diamond drilling crowns on a cost per foot basis.

There can be no clear-cut case for or against contract work in mine drilling, each situation presenting its own peculiar set of circumstances as a basis for individual decision. Many of the pros and cons are mentioned here. Broadly speaking, however, contracts are more likely to be sought by the customer where the work is of an intermittent nature, requires a high degree of skill and know-how, involves the use of specialised equipment and knowledge of special techniques, and where the equipment cost is considerable. Regarding the purchase of production steel and diamond crowns, the major influential factors are usually apprehension concerning the quality or continuity of supplies, backed by an urge on the part of the suppliers to win acceptance of new products.

Taking these methods in turn and expanding, we find that the departmental system is usually employed when the area is remote and where there is a large area to be prospected.

The advantages of this system are that while only one drill is employed, the drilling can be controlled by the man who would normally be on the spot in charge of the prospecting in this area; security of information concerning the work is better; and the expense of delays in waiting for new sites before moving are cut down because the crew can be employed on other work.

Difficulties, however, arise with this method when the amount of drilling increases, as more machines are required and the engaging of additional staff of unknown quality becomes necessary.

Another disadvantage of this system is that when only one departmental machine is in use, it is often difficult to obtain a highly skilled driller, and when difficulties are encountered in the normal run of drilling long delays can be experienced with consequent rise in cost.

The cost-plus system has been used in difficult drilling zones, such as the West Wits. Line, and the original drilling of the Copperbelt in Northern Rhodesia. This drilling was done by contractors who had insufficient knowledge of the area at that time to give a firm price contract. These same areas are today being drilled under firm price contracts.

The system serves its purpose under these conditions, but it does lend itself to abuse and the contract terms must be skilfully drawn up, otherwise disputes arise over what is considered as cost and what as plus; for instance, how are supervision and overhead charges to be rated—as cost or a part of the plus ?

By far the greatest amount of surface drilling is done by the contract price-per-foot system, in which the advantages to the company paying for the work are that the cost of the work can be budgeted with greater accuracy than any other method; no capital cost is incurred by the mining company in paying for plant and equipment. Incidentally, the cost per foot has only increased from £1 10s. 0d. per ft. to £2 10s. 0d. during the past 25 years for a 6,000 ft. hole; competition by tenders from contractors ensures that the price per ft. remains reasonable.

The mining company is enabled to take advantage of the improvements in methods and equipment introduced by contractors over the years.

The contractor is always looking for means to improve performance with a consequent reduction in cost to the mining companies. One advantage to the company paying for boreholes is the supply of trained labour which the contractors maintain.

The risk of encountering difficult drilling ground is borne by the contractor and, provided more than one hole is to be drilled in an area, the contractor can arrive at a close cost per foot based usually on many years of experience.

Individual boreholes, however, will vary considerably. The contract system of a tendered cost per ft. enables a mining house to budget more closely than if it was done on a cost-plus basis where, in the event of the first hole being very high in cost, due to bad ground, the amount of drilling which would be done might be curtailed.

The disadvantages to the contractors are that the risks inherent in this type of work are largely borne by the contractor. Some variations have been introduced in the contract price system whereby part of the risk is shared between the

Drilling for Mining

two parties with consequent reduction in the overall profit.

Another system offers a bonus to the contractor if a target time is beaten in completing a hole. Large capital investment is required for such a risky type of business. Therefore it is not surprising that there are only a few contractors engaged in surface drilling.

Some contractors are sponsored by mining groups who thereby achieve a more even cost for their work, avoiding the danger of paying more for the borehole in boom periods. Also in this way, the group has a greater call on the machines available. This sponsoring helps the contractor in maintaining continuity of work and lessens the financial hazard because the contractor must be assured of sufficient work to warrant the high capital cost.

Diamond Drilling Crowns Supplied on Contract Basis

The contract system, as applied to the manufacture and the sales of diamond drilling crowns, is a most unusual departure from normal sales practice. Prior to the application of this system, the diamond drilling contractor was involved in considerable capital outlay in equipping his field staff with the numerous types and sizes of diamond crowns essential to his drilling programme, usually aggravated by remoteness from source of supply. Many of these crowns might or might not be required in a particular drilling contract, but have to be carried in order to anticipate all field conditions and eventualities. These unused crowns represent considerable idle capital invested and, in the case of the crown supplier, diamonds lying dormant for long periods.

When the contract system is applied, the drilling contractor is supplied with the required types and sizes and pays a predetermined cost per ft. drilled for each crown, dependent upon size, with clauses in the contract to cover the crown supplier against any wilful abuse or abnormal conditions. Payment for footage drilled is made on a monthly basis. An incentive is usually offered in that, broadly, should the contract be running below the original target cost per ft., the saving is split equally between the parties. The cost per ft. is calculated from the initial cost of the crown, less the salvage value of the diamonds after use, divided by the footage achieved by such crowns.

One outstanding feature of the system is that of budget control. The drilling contractor or the mining company, as the case may be, knows before commitment just how much the operation will cost to within fairly close limits, and can either tender or budget his diamond cost per ft. without the necessity for heavy capital investment at the outset.

The rapid return of used crowns is an essential part of the contract, contingent upon distances involved, for the early re-employment of salvaged diamonds. With two such contracts operating in Rhodesia, it has been found economical to institute a weekly delivery by air, bringing this field into very much closer touch with the manufacturer and reducing stocks held by 75 per cent, coupled with the rapid return of diamonds for salvage. An advantage affecting the manufacturer with many customers on this contract basis, is the more predictable demand that is placed on his factory.

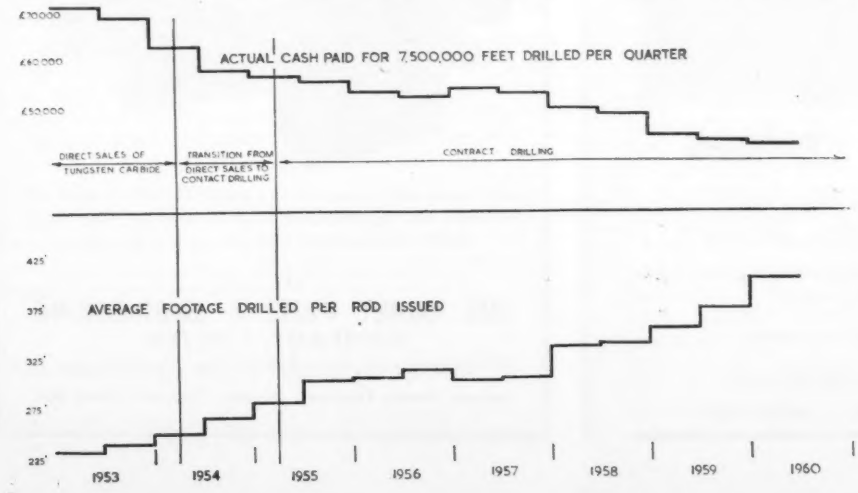
Tungsten Carbide Drill Steel on a Contract Basis

On the Copperbelt some 160 diamond drills are employed on blasthole work, drilling approximately 300,000 ft. per month. The largest contract, which is drilling 2 in. non-coring holes, is operating at a crown cost of approximately 1s. per ft., which includes lost and damaged crowns. Over the past 2½ years, a total blasthole footage of 4,500,000 ft. has been drilled. In tonnage broken this footage would represent some 10,000,000 tons of rock.

It was as recently as 20 years ago that, as a result of experimental work which was carried out on certain mines on the Witwatersrand, it was realized that drill steel tipped with tungsten carbide could be used with considerable economy over conventional drill steel for development and stoping purposes. These experiments showed that penetration speeds were much higher with a consequent improvement in production. Furthermore, the interval between the resharpening of stems was increased from 3½ ft. to approximately 35 ft., which had a marked effect on costs of handling and sharpening.

In spite of these advantages, however, it was found difficult to introduce this new drilling medium into the mines owing to the much higher initial cost of the stems. It was decided by one of the mining houses to purchase tungsten carbide tipped drill steel from the suppliers on a contract basis. A fixed charge per 100 ft. drilled, with a guaranteed footage per stem based on a reduction of cost on that previously obtained with conventional steel was introduced. As a further inducement, it was agreed that any improvement over the guaranteed footage per stem which might result, due to use of tungsten carbide, would be shared with the mines on a 50/50 basis, i.e., the excess footage drilled would only be charged for at half the agreed contract rate.

The advantages, both of the tungsten carbide tipped steel and the contracts, soon became evident and now, after only nine years, tungsten carbide drill steel is used almost universally, and it is doubtful whether any of the mines at present



Graph showing saving to a group of mines on contract drilling in South Africa during July, 1960. (See note at top of next page)

using this on a contract basis will ever revert to the old system of direct purchase.

The following are the main advantages which have become obvious. Drilling costs have been substantially reduced on all mines where the contract system is being employed. The actual savings can best be appreciated by an examination of the graph on previous page which shows the actual savings to a well-known mining group over the period 1952 to 1960. The graph is based on a programme of 7,500,000 ft. per quarter and shows that for the period mentioned, costs were reduced by approximately £25,000 per quarter.

Under the contract system, the mine is no longer faced with the heavy capital outlay necessary to maintain an efficient stock level of drill stems. The contractor undertakes to supply the required number of drill stems needed to meet the mine's drilling programme. The only financial commitment of the mine, therefore, is the monthly payment of the agreed contract rate for total footage drilled.

The incentive clause embodied in the contracts is one of major importance, for the following reasons; first that the user is always receptive to any suggestions that may aid his drilling efficiency, or which will lead to an improved footage per stem, thereby reducing his drilling costs. Second, as the supplier also benefits by the incentive clause, it follows that he must provide the most efficient service possible in order to establish a product suitable for the variations in drilling.

Developing the Basis of Contract

Tungsten carbide drilling on a contract basis has reached such a high state of efficiency that experiments are now being carried out to determine a new contract rate per 100 ft. drilled which will include the sharpening and maintenance of the drill stems. Otherwise the contractor must clearly stipulate the method of grinding to be used and detail grinding wheel specifications, etc., to be applied in this operation; lack of control in this vital operation can lead to substantial variations in footages obtained with the tungsten carbide drill stems. Hence the view, now frequently expressed, that the human element must be removed from the resharpening operations as applied to the tungsten carbide drill stems and the operation be fully automated.

From the manufacturer's point of view, where the bulk of his sales are effected on a contract basis, there must obviously be reductions in costs as his production can be planned on a predetermined load, which naturally results in maximum efficiency. Careful control of stocks, however, must be maintained and the minimum number of stems commensurate with the safe running of the contracts, should be kept on the mine. Stem performance must be closely watched so that any weakness in production or misuse of steel on the mine may be immediately detected.

It is estimated that 25,000,000 ft. are drilled per month in South Africa and Rhodesia on this contract system, and costs vary from 5s. to 26s. per 100 ft. drilled, the price being dependent on local conditions and the drillability of the rock formation. Constant research and development must be maintained, coupled with strict quality control, in order to improve performance.

With all this supervision, these contracts have proved an outstanding success, and ever since their inception there has been a consistent drop in costs which, naturally, has been of immense value to the mining industry.

Pilot Hole Drilling and Water Control by Pre-Grouting

With the extension of mining to the far west of the Witwatersrand and to the Free State, water control has become a very important factor due to the large volumes of water at high pressure which have been encountered underground.

In the Orange Free State, particularly, where it was originally thought that shaft sinking and mining would be relatively dry, this control has become a major operation, as is also the case in the far West Rand. Shafts have been lost due to the influx of water, and the attendant costs of reclamation, coupled with the delay in bringing mines to the production stage, have been very serious.

For this water control, the mining companies have contracted the work to organizations with the necessary equipment and trained personnel. In one mining group in the O.F.S. is has been found necessary to employ 90 diamond drills to give the required cover for shafts and development. The footage drilled for this group amounted to 915,000 ft., with a grout injection of 600,000 pockets over the last 2½ years. The cost of this drilling has been of the order of 15s. per ft.; most of the holes being under 500 ft. in depth ex size (1½ dia.).

It would have been uneconomical for each mine to do this cover drilling and grouting work departmentally as the staff would not have been fully employed. On the other hand, by contracting the work, the contractors are responsible for providing the necessary personnel and plant whenever and wherever they are needed.

The high speed development work which is now a matter of course on most expanding mining properties, requires rapid drilling and grouting to diminish costly delays when water is intersected in the cover holes. The result of increased efficiencies in the drilling sphere has been to spotlight inadequacies in the grouting techniques. In most instances the contractor who undertakes the drilling work also carries out the grouting work. This grouting is normally contracted on a semi-cost-plus basis where the contractor is covered in the event of extensive fissures being intersected, resulting in long periods of injection while the drill is out of action. Such delays are, naturally, not attractive to the mining company, nor, for that matter, to the contractor who may have his drilling equipment standing idle for the full period of the grout injection process.

Consequently research work is being undertaken in an effort to improve grouting efficiencies and to reduce injection periods to a minimum, so that drills can be kept running for longer uninterrupted periods.

Pre-Grouting of Shafts

A major advance in shaft sinking technique has been the development of a method to reduce or eliminate the drilling of cover holes in the shaft bottom during sinking operations. A series of holes are drilled round the shaft site from the surface. These holes are maintained in advance of sinking and all water-bearing fissures in the proximity are sealed by injecting grouting material. It has now become normal practice to drill pre-grouting holes on a contract basis before sinking new shafts. Because water fissures are effectively sealed, very few delays result from the residual water found in sinking operations. This technique has contributed largely to the high rate of shaft sinking in South Africa, the world record of 1,031 ft. in one month achieved at No. 3 Shaft President Steyn being an outstanding example.

Great improvements have been made in the methods of pumping the grout material to the drill hole, also in the application of materials, such as cement, slag, fly ash, bentonite and other additives for this work. How then, in the future, will the contract system benefit mining on the drilling side? Possible innovations will be the use of larger diameter holes for blasting purposes, longer holes for stope blasting, the drilling of large diameter shafts for collieries, and wider development ends.

Bauxite in the Pakaraima Mountains

SPECIMENS of high-grade bauxite collected in the Pakaraima Mountains have been sent to the Geological Survey of British Guiana from time to time, and in 1959 Mr. D. Bleackley, then senior geologist, followed up this clue during a special study of the laterites and bauxites of British Guiana.

Mr. Bleackley found that dolerite sills, which outcropped extensively on the high plateaux, had been weathered over a period, which is estimated to be some 50,000,000 years, to form a thick layer of aluminous laterites and ferruginous bauxites. This discovery led to an intensive campaign of exploration in 1959-60 in which six geologists took part at various times.

The aluminous laterites and ferruginous bauxites were found to extend over some 1,000 sq. m. with a thickness generally exceeding 10 feet. Three areas were selected for more detailed work, and in one of these, the Kopinang River basin, a deposit of ferruginous bauxite, with low silica, has been outlined which would be promising at the present time if it were not so remote from the seaboard.

The area explored measures 1,500 miles from N.W. to S.E. and is some 45 miles wide. It is only inhabited by scattered Amerindian settlements, and is still difficult of access. The mapping, pitting and drilling programmes have been much hampered by poor communications, changing staff and lack of labour. Assessment of the results has been further delayed by difficulties encountered in setting up the new Geological Survey laboratory building. The present report must, therefore, be considered as purely preliminary. Search continues in the enormous area now outlined for better grade bauxites more suitable for the present-day methods of processing.

The deposits now described in the Pakaraima Mountains add to the already vast reserves of ferruginous bauxites which have been mapped in British Guiana. This material is a source of both aluminium and iron, two of the metals most in demand in modern industry, but it is only of marginal economic interest at the present time: it is generally too low-grade for the Bayer alumina process, although the alumina contained is high enough to exclude it from conventional iron and steel works.

Research is proceeding, however, on commercial methods for recovering both alumina and iron, and since these materials are in such great demand it is perhaps not too fanciful to imagine an industrial complex exploiting these low-grade ores with the help of British Guiana's great hydro-electric potential.

These bauxites are described by J. H. Bateson in a report entitled "Preliminary Report on the Ferruginous Bauxites of the Pakaraima Mountains". This publication (Mineral Resources Pamphlet No. 10) is obtainable from the Geological Survey Department, P.O. Box 789, Brickdam, Georgetown, British Guiana (price W.I.$81.00).

Applications of Slow Igniter Cord

SUCCESSFUL firing of stope and development blasts by means of fast burning igniter cord and accurately timed safety fuse is reported from the Muriel gold mine, near Mtoroshanga, S. Rhodesia, in an article by W. A. Bailey, manager, which has appeared in *Rhodesian Chamber of Mines Journal.*

At this mine, the more usual method of timing by means of slow burning cord led to serious difficulty in the amalgamation plant due to contamination of the ore with copper core wires from the cord (see fig 1 and compare with fig. 2) on account of which the use of slow burning cord had to be discontinued. Safety fuses are now supplied to the blasting crews in ready made-up lengths accurately cut and labelled from 0 to 10 in. increment of 3 in. One end of each fuse carries a detonator and the other an igniter cord connector. On charging, delay fuses of the correct numbered length are used in sequence, the outward ends of all fuses being connected to a line of fast burning igniter cord. As near as possible to the holes carrying the shortest fuses, a length of safety fuse is connected to the igniter cord line to act as a safety delay fuse for the whole round, this delay fuse being itself ignited by means of a 4 in. length of igniter cord.

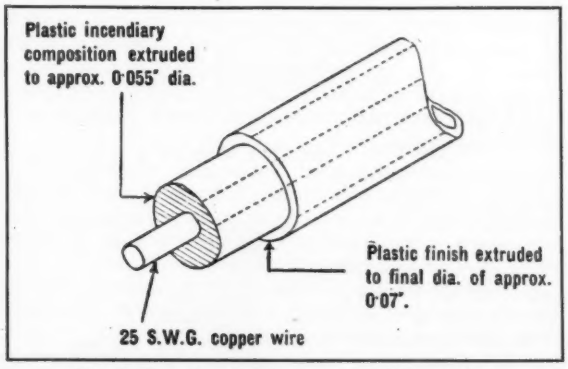
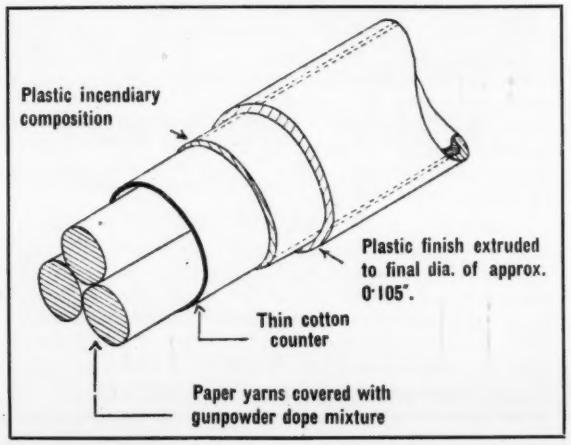


Fig. 1 Slow burning igniter cord (10 secs./ft.)

Fig. 2 Fast burning igniter cord (1 sec./ft.) (note absence of copper core wire)



Using a single length of fuse as a delay for the whole round in this way reduces the length of fuse per hole to the minimum required for blasting, this being least, of course, when the primers are placed near hole collars.

The method of firing described has apparently proved entirely safe and economical in practice. It is pointed out, however, that igniter cord is not always reliable in wet conditions.

MINING MISCELLANY

N.C.B. Production Record.—The N.C.B. has stated that pit output per manshift has reached its highest level in British coal mining, topping the 30 cwt. mark, after achieving record levels for the past 5 weeks. Overall output per manshift reached 1.507 tons in the third week of October, compared with 1.488 a week before, and 1.431 for the same week in 1960. Face workers produced 4.303 tons, compared with 4.264 tons per manshift in the previous week. Output per manshift overall during 1961 averaged 1.432 tons compared with 1.396 tons in 1960. Saleable output from pits and opencast sites rose to 3,975,700 tons, bringing output for the year until now to almost 155,800,000 tons. By the end of 1961 it is expected that almost half the saleable output of coal will be produced by power-loading.

World Shaft - Sinking Record.—The world's shaft-sinking record is claimed to have been broken by 12 ft. early on Wednesday morning at Western Reefs mine in the Klerksdorp area, South Africa. In a 31 day month the No. 4 Shaft was sunk to a depth of 1,118 ft. Hartebeestfontein Mine, also in the Klerksdorp area, exactly a year ago deepened its No. 4 Shaft 1,106 ft. in a 31 day month. This news report is indicative of the continuing progress being made by the gold mining industry in improving its high-speed shaft-sinking techniques. It is just over 2 years since President Steyn mine in the Orange Free State achieved what was regarded as the "four-minute mile of mining", i.e. the sinking of a shaft more than 1,000 ft. in a month. Since then the record has been broken three more times, namely by President Steyn, Hartebeestfontein and now by Western Reefs, a mine of the Anglo American Corporation Group.

Congolese Mineral Exports Decline.—According to figures given by Mr. Marcel Bisukiro, the Congolese Minister for Foreign Trade, mineral exports from the Congo declined to 2,500 tonnes during the first half of the current year from 400,000 tonnes during the corresponding period of 1960. The decline was due mainly to the cessation of Katangese copper exports via Matadi, said the Minister. Exports of tin ore fell from 9,000 tonnes to 500 tonnes. As for gold, officially not a gramme was exported, whereas formerly exports used to range from 12,000 to 16,000 kg. a year.

Tin Reported at Chilton Co. Alabama.—A geologist at Clanton, Alabama, U.S., believes he has found and identified tin in the eastern section of Chilton County on the site of former gold diggings.

Japanese Iron Interests in Guinea.—Nine Japanese pig iron makers are reported to have decided to join in Consafrique's scheme for the development of iron ore in the Republic of Guinea. The project will cost about $5,000,000.

Titanium Dioxide in India.—A new company, Botanium Ltd., has been licensed by the Indian government to manufacture about 4,500 tons of titanium dioxide annually. Land for the factory is being acquired near Bombay, India. Laporte Titanium of Britian are participating in the firm, and capital is also being raised in India.

New Natural Gas Find at Kapuni, New Zealand.—A natural gas field which promises to yield 100,000,000 cu. ft. per day has been discovered in New Zealand at Kapuni in Taranaki Province, North Island. In announcing this discovery the Prime Minister, Mr. Keith Holyoake, referred to the possibility of using the gas for smelting the hitherto unused iron sands, of which many New Zealand beaches are composed.

Japanese Consortium in Indonesia.—A Japanese consortium, Sulawesi Nickel Development Corporation, with a capital of 75,000,000 yen, has been formed by five Japanese nickel concerns for the exploitation of nickel deposits on the Indonesian island of Sulawesi (See *Mining Journal*, July 14, p. 47).

Managanese from the Gabon.—The Ogooue Mining Co. (Comilog) which is exploiting the manganese ore deposits at Moanda, near Franceville, in Gabon, is expecting to ship its first exports during the middle of 1962. A new railway is being built from Franceville to Pointe Noire, the main Congo port, and is to be used mainly for transportation of ore to the coast.

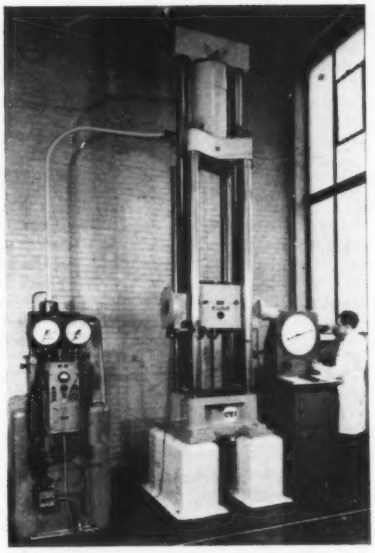
Japanese Test Australian Gold Mine.—Sumitoma Metal Mining, of Japan, has taken a four-year option to test a gold mine at Tennant Creek in Australia's Northern Territory. The owners of the mine are Eldorado Tennant Creek. The mine is already being examined by officials of the Japanese company, who are reported to be interested primarily in copper and other base metals.

China's Iron and Coal Reserves.—Reserves of iron ore in China are now estimated at some 100,000,000,000 tonnes, while coal deposits are put at 1,000,000,000,000, of which some 80 per cent are of hard coal.

World Silver Resources.—The West German journal, *Metall* estimates that some 20 per cent of world silver production comes from actual silver ores. Of the overall total, 45 per cent comes from lead-zinc ores, 18 per cent from copper and cupro-nickel ores, 15 per cent from gold ores and two per cent from tin ores.

U.S. Mining Investment Estimates.—Figures issued by the Office of Business Economics, a branch of the U.S. Department of Commerce, estimate investment in new U.S. mining plant and equipment at some $990,000,000 the same as in 1959 and 1960. Investment on this account in the primary non-ferrous metals industry is expected to fall from $310,000,000 in 1960 to about $260,000,000 in 1961, while that in the primary ferrous metals industry from $1,600,000,000 to $1,160,000,000.

German Iron Ore Mines to Close.—The West German iron ore mining firm, Erzbergbau Siegerland A.G. is closing its Neue Haardt iron ore mine at Weidenau, in the Sieg area, owing to current market conditions. The mine had an annual capacity of about 130,000 tonnes. Erzbergbau Salzitter has announced that the Konrad ore mine in Lower Saxony is to be closed for the same reason, and Barbara Erzbergbau A.G. is closing its Staffhorst mine.



Built and equipped in three years at a cost of nearly £200,000, the Central Research Department of British Ropes Ltd., Doncaster, was opened on October 27, 1961, by Mr. Niall Macpherson, M.P., Parliamentary Secretary to the Board of Trade. This research unit comprises wire and rope research departments and a marine testing station off the Norfolk coast. The rope department is divided into six sections, chemical analysis, metallurgical examinations, physical testing, fibre and synthetics' evaluation, photographic documentation and development. Illustration shows a 100 ton Amsler universal pulsatory fatigue testing machine at work in the laboratory

Fifteenth Century Yugoslav Mine Reopened.—A lead-zinc mine, first operated by the Romans in the second century, and closed after the Turkish invasion of Serbia in the 15th century, has been re-opened at Novo Brdo, Yugoslavia. The mine is stated to contain some 7,000,000 tonnes of ore, with 8 to 10 per cent lead and zinc content and silver traces, reported as rich. The yield is believed to be even higher than at the nearby Trepca mines.

Indian Ore for Roumania.—Under the terms of a recent agreement, India is to supply iron ore to Roumania until 1966. In 1950 India exported 100,000 tonnes of iron ore to Roumania, but is increasing exports to 200,000 tonnes this year, and will rise to 1,000,000 by 1966. Roumania, which is supplying mineral oil in exchange, has guaranteed India an iron ore price of over 80 shillings per tonne.

Norwegian furnaces for Venezuela.—Staff of the Norwegian mining company, Elektrokemisk A/S of Oslo, are supervising the installation in Venezuela of the first of nine electric smelting furnaces, worth £2,900,000, which the firm is delivering.

ECSC Coal Stocks down.—Coal stocks in the ECSC countries at 27,050,000 tons, are the smallest since 1958. While stocks of all producing countries are down, those of France and West Germany are lowest. The dwindling of stocks is ascribed to slowing down of output and to seasonal purchases for winter storage.

Germanium Exports down from Belgium - Luxembourg.—The Belgo-Luxembourg Economic Union exported only 5.6 tonnes of raw germanium, worth 81,340,000 Belgian francs, during the first half of 1961, compared with 7.3 tonnes, worth 105,720,000 francs in the same period last year. Of the 1961 half-year exports, 3.2 tonnes went to Federal Germany, 0.6 tonnes to Japan, 0.5 tonnes to the U.K. and 0.4 tonnes to France.

Harvey Co. in Surinam.—The Harvey Aluminium Co. is reported to have applied for bauxite concessions in a 122,785-hectare area of the Corantijn district of Surinam, while other companies are interested in the newly-discovered bauxite reserves in the Bakhuis Hills.

Iron and Steel Industry for Nigeria.—Plans for an iron and steel industry in Nigeria's Eastern region have been officially announced by Premier Michael Okpara.

French Aluminium Production.—French aluminium production in the first nine months of 1961 totalled 204,507 tons, compared with 169,444 tons in the corresponding period of 1960. France's share in the Cameroun "Alucam" production totalled 29,850 tons, compared with 27,811 tons for the same nine months last year.

Indian Copper Deposits.—Copper ore deposits, with one to five per cent metal content, are reported from Thaneswasla on both sides of the river Vainganga, in the Chanda district where a detailed survey may be undertaken.

New Port for Bahia.—A new port is to be constructed at Campinho, El Salvador, to serve as an outlet for the interior of the state, particularly for the region where iron ore is plentiful. Access is assured by the Ubaitaba-Campinho stretch of the Leste Brasileiro railroad, and highway connection by a 38 kilometre extension connecting up with BR-5 highway. Power will be supplied by the Central Hidroelectrica de Funil. The new port, scheduled for completion within two years, will have 150 m. of docks, at which vessels of up to 12 m. draught can berth.

New Zealand iron sands.—The New Zealand Steel Investigating Co. to whom Battelle Memorial Institute of Columbus, Ohio, act as consultants, is to send concentrates of New Zealand iron sands to the U.K., Norway and the U.S. for tests early in 1962.

Rhodesian-Japanese iron talks.—Representatives of the Rhodesian Iron and Steel Co. have visited Japan for discussions regarding Rhodesian pig iron and iron ore exports. The discussions covered the question of considerably increased Rhodesian iron ore expansion, and the possibility of the construction by Japanese manufacturers of a large blast furnace in Southern Rhodesia.

Jamaican bauxite for U.S.—Reynolds Mining Corporation, of the U.S., which has a subsidiary in Jamaica, estimates that 48 per cent of U.S. bauxite imports in 1960 was supplied by Jamaica. U.S. total domestic bauxite output is estimated at less than a third of this figure.

Indonesian Laterite into Steel.—It is reported from Indonesia that a process, known as the Kamijima process, has been discovered, which will convert laterite containing iron, chromium and nickel ores into steel, and Indonesia and Japan are to co-operate on its application. One hundred tons of laterite, shipped to Japan last March for experimental purposes, is reported to have been converted into 50 tons of steel.

Foreign capital for Chilean copper mine.—Empresas Sudamericanas Consolidadas S.A., of Panama has been authorized to import U.S.$3,000,000 capital, for the use of the Empresa Minera de Mantos Blancos S.A., of Chile, in the Antofagasta copper mine.

Southern Rhodesia's high mineral output.—The value "at mine" of Southern Rhodesia's mineral production for the first six months of 1961 was £13,641,433, an increase of 7 per cent over the corresponding record 1960 figure. Asbestos showed the largest individual increase of 22 per cent over last year's figure, gold increased by 6¼ per cent, but coal and copper were below the 1960 figures for the same period.

Labour Commission study Chilean copper industry.—A tripartite commission, consisting of representatives of the large mining companies, the trade unions of the copper industry and the government, with the Minister of Labour presiding, has been formed to study modifications to the legal regulations relating to workers in the Chilean copper industry.

Radium Hill to close.—The South Australian government-owned Radium Hill uranium mine, near the New South Wales border, is to close, owing to lack of markets, diminishing ore reserves and relatively high production cost. The chemical treatment plant at Port Pirie will also be closed as soon as concentrates on hand, and material at the Radium Hill treatment plant have been processed. All work will cease in December, unless any proposal is received from the Commonwealth government. Since1954, when full scale production started at Radium Hill, £A3,250,000 has been spent on the mine, and the enterprise has earned over £A13,000,000 in foreign exchange during its operation.

Thai tin exports.—Semi-official figures give Thai tin ore exports at 8.883 l.tons during the first six months of 1961, and it is expected that the same amount will be exported during the latter half of the year.

Venezuelan iron for U.S.—Exports of iron ore from Venezuela to the U.S. during the first half of 1961 amounted to 5,350,000 tons, 11.3 per cent of total U.S. consumption, compared with 8,400,000 tons (12.4 per cent) in the same period last year.

Ghana cancels diamond concession.—The Ghana government has cancelled the concession of a Dutch diamond company, Holland Syndicate, operating in Ghana, as the State Mining Corporation is in future to undertake exploitation of minerals in its area. The takeover followed a decision by the company to suspend operations if it received no financial aid from the government to meet rising costs.

Pechinéy to aid Poland.—Pechinéy is to give technical aid for the construction of the Polish aluminium plant at Konin, which will have a capacity of 95,000 tons a year, and is expected to start production in 1965.

Chaseside have just despatched a further five Loadmaster 1,000 4-wheel drive loading shovels to the province of Santiago del Estero in the Argentine. Part of a £1,500,000 contract for British construction equipment, the order was secured by Mercator S.A. of Buenos Aires and Knowles & Foster, of London, and follows quickly upon a previous package deal for similar equipment for the province of Neuquén in Argentina

Machinery and Equipment

Spray Guns Grease Hoist Rope

An experiment with a new and speedier method of lubricating mine hoist ropes by means of sprays, instead of grease boxes, is in its last stage. The outcome, which may revolutionize hoist rope lubrication methods on the mines, will be known within the next few months.

Noxal Co. (S.A.) (Pty.) Ltd., of Johannesburg, South Africa, followed up reports that mine consulting engineers were interested in a method of lubricating their Haggie Son & Love mine hoist ropes with a liquid dressing instead of heavy greases. The liquid dressing would lubricate the rope internally.

The company engineers rigged up a mock headgear in the yard of their New Doornfontein premises and experimented with an Atlas Copco Ecco 30 A automatic spray gun, intended for mass production painting and for other industrial purposes such as oiling and wetting, and designed for automatic operation on a permanent mounting. These experiments gave them an indication of the spread of oil.

On the instructions of the consulting engineers of the Van Dyk Consolidated Mines Ltd., at Boksburg, the company installed their spray guns rigged at 120 deg. angles to each other on a horse-shoe plate—around the hoist rope of the No. 3 Shaft of the mine. The unit was mounted immediately below the sheave, where whipping of the rope is at a minimum.

To establish the periods for which the guns should operate, four Noxal Co. engineers sat in shifts in a day-and-night vigil in the headgear for several weeks, operating the spray guns manually. The automatic unit was then installed. It consists of micro switches which operate a solenoid air valve to trigger the pressure to the sprays.

The automatic unit also contains a memory switch which records the number of trips done. After a certain number of trips, the memory switch locks the solenoid valve in the open position, but should the skip come to rest the micro switches override the solenoid valve and cut it off.

A recent preliminary test, in which the rope was examined 600 ft. from the end by prising open the strands, showed that the oil was penetrating the core. Under the method used at present, heavy grease is applied to the ropes through a box mounted around the rope. It takes about half an hour to assemble the box around the rope. The dressing is heated and poured into the box manually while the rope is lowered at a very slow speed. This delay—which is costly when shaft-sinking records are being attempted—could be eliminated by the new system.

SAFETY IN SHAFTS

When consolidating vertical or steep shafts, the risk of falling debris often makes it necessary to work from the top down. The rational solution would be, of course, to proceed from the mine gallery upwards.

A Swedish mining company found a solution in the form of an umbrella. It is a rubber plug that is inflated to provide a resilient shield over the consolidation crews and is moved up with the progress of the work.

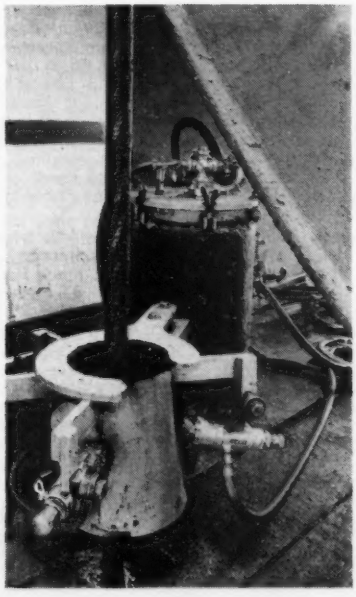
Cut-away of the ISS Guard hard hat by Safety Products Ltd. showing the new polythene all adjustable head harness which can be worn either in the orthodox style with chin strap or headsling style, thus eliminating the necessity for a chin strap except under unusual conditions

The plug looks like a rubber balloon with a nylon cord reinforcement. Its walls are 0.118 in. thick, and where added protection is required, gunny bags filled with, say, wood shavings, can be placed on top of the plug. The method has been successfully utilized for the consolidation of shafts up to nearly 600 ft.

MINE PARTITION WALLS

Mass production is to begin by South African mining groups of the new compressible light-weight brick for use in the construction of partition walls in underground workings. The brick has been developed by the Council for Scientific and Industrial Research, Pretoria, in collaboration with the Anglo American Corporation. It has been designed for the construction of ventilation sealing walls in the stoping areas of mines where the rock ceiling descends slowly over a long period.

Three Ecco 30 A spray guns rigged at 120 deg. angles to each other around the hoist rope on No. 3 Shaft, Van Dyk Mines, Boksburg, South Africa. The guns are being used to spray a thick oil on to the ropes in an experiment which may revolutionize the method of lubricating mine hoist ropes



Wal's made of these bricks can withstand a fall in the roof of as much as 50 per cent without collapsing as would be the case if ordinary building bricks or concrete blocks were used.

The new compressible bricks are made of exfoliated vermiculite, the particles of which are bonded together with bitumen. As an alternative to bitumen PVC emulsion can be used, but this process is more costly.

To build a wall, a thin coating of bitumen binder or of PVC emulsion is simply applied between the bricks, and the wall is built as if ordinary bricks and mortar were being used.

Compression tests carried out by C.S.I.R. in collaboration with mining engineers, both in the laboratory and underground, have shown that the bricks can be crushed to a third of their size without showing any signs of breaking up.

NEW RECORDING MINER'S LAMP

A need in mining has been for the continuous detection and automatic recording of the changing density of combustible gases present in the atmosphere.

The Mining Research Establishment of the N.C.B. has developed such an instrument—the recording methanometer—which detects and records continuously the presence of these gases. The instrument is now in production and is manufactured by The Sigma Instrument Co. Ltd. under licence from the N.C.B.

The Sigma recording flame methanometer installed in mines or industrial plants is claimed to give an accurate and visible record of up to 3 per cent of combustible gases in the atmosphere. It will run for seven days without attention, maintenance is simple, needing no great technical knowledge or skill. It is proof, however, against tampering by unauthorized persons.

The basic principle of the instrument is a constant burning butane flame, in a gauze chamber, and fed from a high pressure Butane tank. The jet and the flow of the fuel are controlled by the precision built Sigma miniflow governor which maintains in uncontaminated air a non-varying flame. The hot waste fumes from the flame pass a ring of thermocouples, with unpolluted air the temperature of the flame and waste fumes remains constant and the Pen recorder, connected electrically to the thermo-couples, gives a continuous zero reading. When the air supply to the burner is contaminated by combustible gas there is an increase in the temperature of the flame and of the exhaust fumes. The increase in temperature of the exhaust fumes increases the output voltage of the thermo-couples and the recorder pen is deflected. A continuous recording is made on a calibrated chart giving the density percentage of combustible gases present. These recordings

are accurate with 0 to 3 per cent of combustible gas present.

The precision built miniflow governor used in the Sigma recording flame methanometer to ensure a constant and unvarying flow of butane gas is also manufactured by Sigma under licence from the N.C.B. It has many other applications in industry and research and can be supplied as a separate instrument.

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A new crusher for secondary duty has been produced by Kennedy Van Saun of New York. It is claimed to require less head-room and the head is top-supported by multiple hydraulic cylinders. In this way, the setting is automatically held in the set position and variation in setting is simple. Stress relief for tramp material is also provided.

ELECTRONICS CENTRE FOR N.C.B.

Associated Electrical Industries Ltd., has received an order worth more than £250,000 from the Scottish Division of the N.C.B. for a fully integrated data processing system incorporating the AEI 1010 digital computer. This will be one of the installations which will play a part in the eventual unification of data processing throughout the whole coal industry in this country. The AEI 1010 is the fastest computer of its kind available. It will handle wage and salary data of 90,000 people in 132 collieries, 22 brickworks and other establishments. It will also undertake materials and supplies accounting, involving costing and processing of 14,600 stores items a day, and will record despatch of 4,500 loads of coal a day. Since there are some 1,200 different qualities of coal, the latter is a complicated task. As a by-product of its normal programme the AEI 1010 will provide automatically any statistics for marketing, finance control and other purposes.

CHROMIUM PLATING ON AIRLEG CYLINDERS AND CHUCKS

Lubrication of the airfeed leg on stopers has always presented a problem. A recent number of *Mining Congress Journal*, however, points out that this defficiency can be overcome by drilling a small hole through the shaft and collar of the air feed piston. This introduces a fine spray of oil from the oiler into the feed leg.

Records kept by operating companies show that the average life of a cylinder in an airleg drill is about four years. In the past the walls of the worn cylinders were honed and oversize pistons inserted, adding about three years to the life of the cylinder. It was found that there was considerable leakage of air around the ports, however, and the practice has been discontinued. Now cylinders are reconditioned by chrome plating, which doubles the life at about one-third the cost of a new one. The added life adds some 85,000 to 100,000 ft. of drilling footage to the cylinder.

The average life of valves in the drills is about three years; by refacing them in the machine shop their service life can be increased about 2½ years.

Excessive wear on chuck bushings has been reduced by making the rotating sleeve and chuck in one unit. When made separately, they get out of alignment when worn and cause excessive wear on the bushings.

Equipment Digest

The new sinter plant and ore-handling installation at Lysaght's Scunthorpe Works have been designed to handle 600 tons of run-of-mine ore per hr. The main contractor for this project was Head Wrightson Iron & Steel Works Engineering Ltd. who placed an order for ore handling plant with The General Electric Co. Ltd. Certain equipment for this installation was also supplied by G.E.C. through Ross Engineers Ltd. The total value of the G.E.C. contracts was approximately £700,000 and included a 60-ton side-discharge wagon tippler, crushers, conveyors, screens and feeders.

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A new Dodge tipper is run continually in first and second gear with the higher gears hardly ever engaged in the Ilston quarries of Norton Limeworks Ltd., in the Gower Peninsula. The tipper carries limestone from an excavator loading at the bottom of the quarry up a steep slope to a crusher. The climb to the crusher is at a gradient of 1 in 5, over a loose surface with scattered rocks.

The Dodge is an 8 ton 116¾ in. wheelbase model fitted with a 354 cu. in. direct injection diesel engine, five speed gearbox, and two speed rear axle and was supplied by J. & P. Bevan Ltd. The 6 cu. yd. dumper body is of all welded steel construction, 11 ft. 5 in. long and 6 ft. 11 in. wide internally with an inside depth of 3 ft. The body is scow ended, without a tailboard, and has a full-width cab protector. It is constructed throughout from ¼ in. mild steel plate, reinforced by 5 in. by 2½ in. rolled steel channel cross bearers and ribs. A sandwich floor is used to give high impact resistance. Top and bottom floor plates of ¼ in. steel enclose a 1½ in. thickness of hardwood, the complete floor unit being bolted together. Pilot heavy duty twin underbody ram tipping gear is fitted. The new vehicle, in conjunction with a smaller Dodge dump truck, supplies all the stone to the crusher.

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Since The General Electric Co. Ltd. marketed its motor control centre some three years ago many improvements have been incorporated based on service experience. For example the range of control gear which can be accommodated has been extended to include starters up to 150 h.p. and switch-fuses up to 200 A with no increase in the overall size of the cubicle. A duplex design for installations where floor space is at a premium has also been introduced. In the duplex cubicle the starter trays are mounted on both fronts with a saving of space of 6 inches over two single-fronted cubicles mounted back-to-back.

Technical Description No. 445, which describes this class of switchgear, has been completely revised and much additional information added. Obtainable from the Company's Witton Publicity Department, Birmingham, 6.

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A detector against carbon monoxide gas consists of a small thin plastic plaque approximately 2 in. by 2 in. that can be worn on the lapel of a worker. This plaque contains a circular light yellow patch that turns black within minutes of being exposed to a carbon monoxide polluted atmosphere at well within the danger limit. U.K. distributors are Herzbi Ltd., 57 Lordship Park, London, N.16.

The Cambridge magnetic oxygen meters manufactured by the Cambridge Instrument Co. Ltd., have been developed for the determination of oxygen concentrations using methods based on the high paramagnetic susceptibility of the gas. The fact that all other common industrial gases, with the exception of nitric oxide, are diamagnetic enables accurate oxygen analysis to be carried out. Two types of instrument are available, the filament type and the annulus type. The instruments are largely complementary and have a wide range of industrial applications. The annulus type is to be recommended particularly for oxygen estimations where more than 1 per cent hydrogen or helium is present or in applications where a higher speed of response is desirable. It is, however, affected by carbon dioxide and must be level when used. Conversely the filament type detector is comparatively insensitive to carbon dioxide and is more suited to conditions associated with change of level, such as on sea going vessels. Minimum ranges are 0-8 per cent or 0-2 per cent oxygen full scale.

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The catalogue *Steel Conveyor Roller Chains* has recently been published by Precision Chains Ltd.

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Recent pamphlets from Hadfields Ltd. describe in detail the company's range of jaw breakers and fine steels. In many existing quarries Hadfield crushers are still in full commission after 40 to 50 consecutive years of service. The use of Era manganese steel for wearing components contributes in no small way to strength, and the booklet presents the most important features of the breakers together with a guide to capacities, weights and dimensions, etc.

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Pamphlets have been received describing the Good-Win roller bearing granulators and stone crushers manufactured by Goodwin Barsby and Co. Ltd a member of the Aveling-Barford Group. The standard range in the latest design of granulator covers four sizes, 20 in. by 5 in., 24 in. by 6 in., 30 in. by 6 in., and 36 in. to 6 in., full capacities and dimensions are given. The stone crushers produced by the manufacturers range from the 16 in. by 10 in. model to the 48 in. by 36 in. unit.

Other recent literature from the Aveling-Barford Group describes the Good-Win high speed crushing rolls comprising three units and a 24 in. by 14 in. to 30 in. by 24 in. range, giving capacity from 10 to 12 t.p.h. of ¼ in. material to 100/120 t.p.h. of 1¼ in. material. Mobile units include the Barford 75 dumper of 10 cu. ft. maximum capacity, the Aveling-Austin Super 500 grader, the Aveling-Barford 30 ton payload S.N. dumper, as well as the Aveling-Barford T.S. 250 tractor shovel and the Barford 150 dumper.

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A work boot fitted with Neoprene soles and heels that will withstand 150 deg. C. is employed in the U.K. in factories where the manufacture of insulated cable is carried on. The Neoprene soles and heels are made by Bank Bridge Rubber Co. Ltd. from Du Pont material. The boots are marketed by Banksman Footwear Ltd.

Metals and Minerals

Magnesium's Challenge to Aluminium

Speaking at the annual convention of the Magnesium Association, which opened in New York on October 16, Major J. P. Ball, chairman of Magnesium Elektron Ltd., England, urged the magnesium industry to intensify its promotion and marketing and suggested that producers should concentrate their drive on greater use of the metal in motor cars. Their aim, it was stated, should be to offer products made of magnesium at the same prices as those made of aluminium. On this basis, he pointed out, consumers would have the benefit of lighter weight and higher machining speeds. Magnesium pressure die castings could be made faster with magnesium than aluminium while die life was greater.

Taking as the subject of his address the theme of the conference, "Magnesium in Focus", Major Ball pointed out that, while consumption had doubled in Britain and had increased fivefold in Germany, *per capita* use in the U.S. at about 0.66 lb. was about the same in 1960 as in 1952. On the other hand, in France it had increased from 0.051 lb. to 0.08 lb., in Britain from 0.26 lb. to 0.55 lb. and in Germany from 0.22 lb. to 1.19 lb.

In the U.S. the biggest change since the Korean crisis had been a substantial decrease in defence orders, which had been only partially replaced by the expansion of commercial use. Not until 1955 did civilian consumption amount to more than one-half of total use. This was probably the main reason for the difference in the rate of the industry's progress in the U.S. and elsewhere. In Germany, for instance, the industrial use of magnesium was well established. Moreover magnesium development in Europe was backed by low cost production, particularly in Norway, which was well located to supply the Continent's import needs. Norway, which initially had a capacity of 10,000 tons, is now producing from 15,000 to 18,000 tons annually and plans to increase its potential to 25,000-30,000 tons.

According to Mr. Jerry Singleton, executive secretary of the Magnesium Association, U.S. non-defence use of magnesium in 1950 amounted to more than 70 per cent of total consumption. Studies by the Association indicate that consumption of primary magnesium in 1961 will exceed last year's figure by about 10 per cent.

A survey by *American Metal Market* points out that the potential annual capacity in the U.S. for primary magnesium production is now over 95,000 tons, but last year production amounted to little more than 40,000 tons or about 43 per cent of capacity. On the other hand, total shipments of primary metal amounted to more than 54,000 tons. The excess of demand over new production was met from plant stocks; these inventories have been reduced and production levels have been increased from 2,000 tons a month in early 1959 to about 4,000 tons currently.

As regards applications, it was stated at the conference that one of the largest uses was for alloying other metals, which accounted for nearly a third of production and represented more than one-half of the total.

The use of magnesium in aircraft has been decreasing in both tonnage and percentage of total use, in line with the transition to jetcraft and high-speed missiles. In the U.S., consumption for aircraft and missiles declined from about 9,800 tons (23.2 per cent of total end use) in 1958 to 7,100 tons (15.9 per cent) in 1960. On the other hand, use in consumer products rose from 5.4 per cent in 1958 to 7.7 per cent in 1960 and in surface vehicles from 1.9 per cent to 2.5 per cent.

That magnesium is also becoming increasingly important to the space programme was indicated by an announcement made at the convention by Dow Metal Products division of Dow Chemical Co., to the effect that magnesium will be extensively used in the construction of Rangers Nos. 3, 4 and 5, the first U.S. spacecraft designed for landing on the moon. According to Dow, the magnesium components of the Ranger vehicles will include six main chassis boxes and about 80 sub-chassis boxes for housing electronic gear. The main boxes in the electronics section, which are the heaviest items of the spacecraft structure, measure 15½ in. by 13 in. by 4¼ in. and are being machined from magnesium tooling plate.

Mr. Paul D. Frost, of the Battelle Memorial Institute, spoke of a new lithium-magnesium alloy under consideration for structural components of missiles and space rockets. He told the convention that new alloys with 11 per cent or more lithium were about 20 per cent lighter than magnesium and were also more ductile. Their use could allow the critical booster weight-to-payload ratio to be stepped up considerably. A further advantage offered by these alloys is increased resistance to penetration by high velocity space particles.

INDIAN BAUXITE EXPORTS

The government of India has decided to allow the export of 350,000 tons of bauxite annually for the next two years, according to an official Press release. Of this quantity, 150,000 tons of bauxite will be allowed for export from the port of Saurashtra and 100,000 tons each from Bombay and Calcutta. Exports will be allowed irrespective of the origin of the bauxite.

The government has been reviewing the export policy of bauxite for some time past in view of the rapid development of the aluminium industry in India on a massive scale. Having regard to the export commitments already made by Indian exporters, the present policy has been decided as a short-term measure for the next two years. Exporters are being advised not to enter into any commitments beyond this period of two years.

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In what is regarded as a major step in opening a major new market for aluminium, the H. K. Porter Co. has announced that the low voltage winding in the distribution transformers being manufactured by its Delta-Star Division is now utilizing aluminium strip instead of copper wire.

The company is believed to be the first in the industry to offer this kind of electrical transformers.

In switching to aluminium, Delta-Star developed a new rectangular core design, claimed to eliminate mechanical stress and to provide maximum magnetic performance. The company said this meant that the new units could withstand short circuit currents of more than 50 times rates current.

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Aluminium Ltd. is about to close all its bauxite operations in the Republic of Guinea at the request of the country's government. The announcement said the Guinea government asked the company to stop mining bauxite in Guinea within the next few weeks after the company was unable to solve the financial problems involved for the proposed aluminium complex at Boke.

Aluminium Ltd. had announced several months ago that its subsidiary, Bauxites du Midi, was suspending development of the project until financial difficulties were worked out.

In addition to the Boke project, the company's operations in Guinea include a bauxite mine at the Los Islands which produces about 400,000 tons each year. Some of the bauxite was shipped to Aluminium Ltd. smelters in Canada. It will be replaced by bauxite from other sources, the company said.

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Lord Plowden, chairman of British Aluminium said in his annual statement that it was difficult to forecast much better conditions in the U.K. aluminium industry in the immediate future. However, as industrial production moved ahead, demand was expected to increase fairly quickly. He said that aluminium prices in overseas markets remained weak, reflecting the current over-supply of both virgin and fabricated aluminium in practically all countries, a condition which might persist for some time.

Major cost reduction and rationalization programmes are being undertaken in all the company's plants, but so far as this year was concerned Lord Plowden said he would hesitate to predict any great improvement in profits, except for the primary production operations in the U.K.

Looking a little further ahead, the prospects seemed to be better, he added. Aluminium usage was still developing and economic activity must move ahead again. To meet this growth, the company was continuously improving and developing its plants. In due course it would be going ahead with a major expansion of its large rolling mill at Falkirk, though the phasing of this extension might be subject to review in the light of economic developments, he stated.

U.S. MAY STOCKPILE BERYLLIUM

The newly-organized Office of Emergency Planning, formerly O.C.D.M., is making a study of America's possible stockpile requirements of beryllium. The potential applications of this light, heat-absorbent metal are growing at a very rapid rate and the Defence Department is investigating a number of possible military uses.

Since much of the work is still in the experimental stage, comments the *American Metal Market*, the Pentagon cannot as yet make accurate estimates of its needs. The O.E.P., however, is taking a long range look at the progress in finding new uses for beryllium and is attempting to estimate how much of this mineral might be required for the national stockpile in case of war. At present, there is only a moderate supply of beryllium.

Up to now the U.S. has obtained most of its beryllium from beryl imported from

Latin America and Africa. New processes are being developed to use phenacite and bertrandite of domestic origin as well as beryl, as ore sources of the metal, but these are still in the experimental stage.

The Federal Government pays up to 50 per cent of the exploration costs for beryllium prospectors, but only a moderate increase in production is expected. Only two prospecting contracts, to a total value of $50,000, are at present in progress. O.E.P. has urged the Department of Agriculture to use the barter programme to obtain 175,000 lbs. of beryllium.

A new plant for fabricating beryllium has been officially opened at Cleveland by the Brush Beryllium Co., one of the two leading U.S. producers of beryllium metals. The plant, which represents a $3,000,000 capital investment, is expected to contribute to a further reduction in the price of the finished beryllium product which has already been approximately halved during the past few years.

Nevertheless, producers of beryllium will have to cut the price of the metal further before it finds major rocket propellant application, according to Mr. D. F. Sprenger, manager of the Solid Rocket Plant, Sacramento, Calif., who told the *American Metal Market* that beryllium looked more attractive than any other metal from an energy standpoint and would probably find some restricted uses in rocket fuels.

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Disc brakes using steel coated with beryllium may be on the way in the motor car industry, according to a spokesman of the Beryllium Corporation, while beryllium foam, another new development may be used in missile wall structures.

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A new method of improving the grain structure of beryllium copper casting alloys is now being applied by the Beryllium Corporation in the manufacture of Berylco beryllium copper casting alloys and is resulting in the casting of parts of finer grain size and improved quality, it is claimed.

CADMIUM PRICE RAISED

The United Kingdom delivered price for Commonwealth cadmium will be raised from 11s. to 11s. 6d. per lb. With effect from November 1. This is the first change for about a year. The increase is said to reflect supply and demand considerations.

CHEAP FOREIGN ANTIMONY

There are plenty of cheap offers of foreign antimony metal still available, according to trade sources in London, but these have not gained much response from buyers.

Chinese metal of 99.6 per cent purity remains quotably unchanged at £175 per tonne c.i.f. U.K. which, on a delivered basis here, including the import duty, conversion to a long ton and other charges, is in the region of £12 below the comparable domestically produced grade of £237 10s. delivered. But even cheaper offers are said to be emanating from the Continent at £165 c.i.f. or possibly less,

which would make the difference with the domestic grade still greater. It is believed that these cheap Continental offers could involve either unwanted Chinese or Russian metal obtained through barter deals.

Some lower grade Russian antimony of 99 per cent purity is also understood to be available ex-warehouse here on a delivered basis of about £205 per long ton compared with the domestically produced delivered price of £230.

Consumption of antimony metal in the U.K. is still running at a fairly satisfactory level, although as a total of 3,479 tons for the eight months ended August 31 suggests, it is unlikely to reach the exceptionally good offtake of 5,719 tons reached in 1960.

U.S. LOAN TO INDIA

The U.S. will lend India $20,000,000 for the purchase of non-ferrous metals under the terms of an agreement signed last week.

The loan, to be channelled through the U.S. Development Loan Fund, will be repayable in Indian currency. The money will be used to buy from the U.S. aluminium, copper and zinc to meet the demands of the expanding Indian industry.

U.K. WOLFRAM ORE MARKET

Business in wolfram ore has, to all intents and purposes, dried up completely, and in the circumstances, dealers regard the present price of 117s. to 119s. per long ton unit c.i.f. Europe for minimum 65 per cent material as nominal. Unless demand shows some revival shortly, pressure against current levels will build up as sellers become increasingly prepared to accept lower prices.

U.K. MANGANESE ORE MARKET

The depressed conditions which have now characterized the manganese ore market for so long still show no signs of ending.

The steel industry is operating well below capacity which has an obvious impact on the market, especially as plenty of ore is reported to be offering from the major producers. In this connection, it is understood that it is becoming increasingly difficult to obtain a premium for the higher grades above 46/48 per cent material, the price for which, although it remains quotably unchanged at from 66d. to 68d. per long ton unit c.i.f. Europe, nevertheless does not appear particularly secure.

In the circumstances, buyers may not start thinking seriously about covering their anticipated 1962 requirements for the time being. Certainly this could well be true of the U.K. where stocks are still high.

U.K. imports of manganese ore and concentrates during the first eight months of this year amounted to 325,900 tons against 331,129 tons during the corresponding period of last year, according to figures released by the Board of Trade.

U.S. QUICKSILVER OUTPUT

Production of quicksilver in the U.S. rose by 7 per cent to 8,700 flasks during the second quarter of this year. General imports of the metal fell sharply in the second quarter to 1,244 flasks, a fall of 59 per cent from the level of the preceding quarter and the smallest since the third quarter of 1957. Exports in the second quarter totalled 43 flasks and there were no re-exports of the metal.

Industrial consumption of quicksilver fell from 13,400 flasks to 12,400 flasks during the second quarter mainly because of reduced demand for the metal for agricultural purposes, electrical apparatus and the manufacture of industrial and control instruments.

Domestic mine production amounted to 8,700 flasks during the second quarter, showing a rise of 7 per cent over the previous quarter and, except for the final quarter of last year, it was the largest output since the final quarter of 1958.

While consumers' and dealers' stocks held steady at 16,400 flasks during the second quarter, producers' stocks rose to 4,270 flasks from 3,107 flasks recorded during the first quarter.

PLATINUM GROUP METALS

Consumption of platinum - group metals in the U.S. based on sales to consuming industries totalled 197,240 oz. during the second quarter of 1961 which was 10 per cent more than in the first quarter of this year, and 27 per cent more than in the corresponding period of last year, according to the U.S. Bureau of Mines.

Sales of platinum group metals during the first half of this year totalled 377,000 oz. (428,000 oz.). Net imports of the metals at 241,500 oz. were 68 per cent greater than in the preceding quarter and 60 per cent greater than in the second quarter of last year. No platinum-group metals were acquired for the government stockpile under the barter programme. Palladium was removed from the list of materials eligible for barter as present authorizations for it have been fully taken up.

Sales of platinum in the second quarter were 28 per cent higher than in the first quarter. Palladium sales rose two per cent because increased demand for electrical uses, which comprised about three-quarters of total sales, more than offset lower demand for other industrial uses. Aggregate sales of the minor platinum-group metals: iridium, osmium, rhodium and ruthenium dropped 11 per cent below those recorded for the first quarter.

Total stocks of the platinum metals group held in the U.S. amounted to 586,989 oz. at the end of the second quarter compared with 493,587 oz. at the end of the first quarter of this year.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Following last week's trend, stocks in U.K. official warehouses at the beginning of the week were down in the case of copper and tin and up in the case of lead and zinc.

MT. ISA HOPES OF SETTLEMENT

Copper stocks in U.K. official warehouses fell by 590 tons to 15,560 tons. On the L.M.E. the contango stands at 10s. to 15s., whilst prices over the week have fallen by about 20s. for cash and 25s. for forward metal. In the main this can be attributed to lack of outside interest both in the U.K. and on the Continent, and to rather less optimism in the U.S. regarding consumption during the rest of the year.

From Santiago it is learned that the El Salvador and Potrerillos Unions have confirmed their non-acceptance of the wage increase counter proposals put forward by the Andes Copper Co.; a contract agreement is scheduled to be reached before November 7 when the temporary agreement ends. On the other hand, the dispute at Mount Isa which has closed the mine since September 25 is expected to end very shortly.

The Central Statistical Office in Salisbury reports that Rhodesia and Nyasaland exported 43,000 s.tons of copper in July this year compared with 45,500 in June and 53,000 tons in July, 1960. Exports of copper concentrates during these months were 1,834 tons, 785 tons and 2,864 tons respectively. From Johannesburg it is announced that production of all types of copper in September this year was 4,940 tons compared with 4,811 tons in August, and 4,409 tons in September, 1960. From Uganda it is announced that last year the Jinga smelter produced a record 14,515 tons of blister. Output of electrolytic in Japan for September this year was 23,702 tonnes compared with a record 24,076 tonnes in August. Copper sales by ENAMI for the account of small Chilean producers during the past week totalled 488 tons.

WITHDRAWAL FROM I.T.C. THREAT

Tin stocks in U.K. official warehouses fell by 122 tons to 4,433 tons. On the L.M.E. the contango has been eliminated and there is now a small backwardation. Prices over the week have risen by about £15 for both cash and forward metal. The increase is generally thought to be due to technical considerations rather than to increased demand, whilst the emergence of a backwardation can be traced to a further fall in stocks which is expected to persist.

Shortly the question must arise again of releases from the 50,000 tons of tin which the U.S. Government has declared surplus to its strategic stockpile. If there is a shortage of metal in the opening months of 1962 some quick action might conceivably be taken to authorize releases. In any case, the present uncertainty regarding releases could well restrain the recent upward movement in the price of forward metal. In La Paz the President of Comibol has stated that tin producing countries would withdraw from the International Tin Council and form a "pool" of their own if, by February 14, the Council did not agree to fix tin price limits at £800 minimum and £1,000 maximum.

On Thursday the Eastern price was equivalent to £972½ per ton c.i.f. Europe.

LEAD-ZINC LITTLE CHANGED

Lead stocks in U.K. official warehouses rose by 575 tons to 11,184 tons. On the L.M.E. there has been little change over the week either in contango or price, which reached its lowest point for about 15 years. From Geneva the International Lead Zinc Study Group has indicated that reported production plus anticipated imports from countries for which no data is available would exceed demand, but that curtailment of output by some countries throughout the first quarter of 1962 would result in ap-

propriate balance in that quarter.

Statistics issued by the Metal Syndicate show that in September Spanish production of lead was 6,130 tons compared with 5,732 tons in August and 2,587 tons in September 1960. Total production for the first 9 months of this year was 46,741 tons. From Salisbury it is announced that Rhodesia and Nyasaland exported 30,400 centals of lead during July compared with 17,600 centals in June and 22,300 centals in July, 1960. Refined lead output in the O.E.C.D. producing countries totalled 67,900 tonnes (provisional) in September compared with 45,703 tonnes in August. Stocks at the end of September amounted to 57,214 tonnes (provisional) compared with 54,372 tons in August.

Lead ore and concentrates output was 34,854 tonnes (provisional) in September, an increase of about 4 per cent over the corresponding month last year. Output of lead in Japan for September was 7,671 tonnes compared with 6,242 tonnes in August.

In America the price of lead has been reduced by ½ c. per lb. to 10½ c. New York basis. The lack of demand and accumulated supplies are given as the reason for the reduction.

Zinc stocks in U.K. official warehouses rose by 385 tons to 10,787 tons. On the L.M.E. there has been little change over the week in either contango or price. From Geneva it is announced that the International Lead Zinc Study Group expects approximate balance between new supplies and consumption in the first half of 1962. Production and consumption are both expected to rise at about the same rate as in 1961.

Statistics issued by the Metal Syndicate show that in September, Spanish production of zinc was 3,306 tons compared with 2,723 tons in August and 3,136 tons in September 1960. Total production during the first 9 months of the year was 26,395 tons. From Salisbury it is announced that Rhodesia and Nyasaland exported 41,000 centals of zinc in July compared with 44,500 centals in June and 54,500 centals in July 1960. Refined output in O.E.C.D. producer countries totalled 77,684 tons (provisional) in September compared with 78,721 tons in August. Of the September total high grade and special high grade accounted for 26,038 and others for 51,646 tons. Stocks of refined at the end of September were 75,091 tons (provisional) compared with 82,549 tons at the end of August. Zinc ore and concentrates production in September was 54,034 tons of metal content (provisional) compared with 41,599 tons in August. Output of zinc in Japan for September was 18,306 tonnes compared with 18,971 tonnes in August. About 10 per cent more zinc is expected to be used in American car models in 1962 than in 1961.

The International Lead Zinc Study Group has so far made no decision about time and place of the next session, nor about the headquarters of the Group.

RHODESIAN OUTPUTS

The Rhodesian Government Mining Engineer has issued the following figures for mineral production (in s.tons) :—

	August 1961	*July 1961*	*August 1960*
Copper (electrolytic)	34,052	35,148	33,033
Copper (blister) ...	8,472	11,609	14,687
Zinc	2,525	2,516	2,520
Lead	1,304	1,241	1,200

NON-FERROUS STATISTICS

The British Bureau of Non-Ferrous Metal Statistics states that imports of Russian lead into the U.K. in the first 8 months of 1961 totalled 7,890 tons compared with 5,762 tons during the whole of 1960. If the 1961 rate of import continues throughout the remainder of the year, Russia is likely to replace Spain as the third biggest supplier to the U.K. market. From the same source it is learned that imports into the U.K. of Russian ordinary high grade zinc in the first 8 months were 19,130 tons compared with 17,940 tons for the whole of 1960.

At the Mount Isa mines lead bullion output dropped to 1,050 tons in the four weeks to the middle of October from 2,860 tons in the previous four weeks. Figures for zinc concentrates for the same periods are 1,184 tons and 2,636 tons respectively.

The premium on special high grade (99.99 per cent) zinc from U.K. and Commonwealth producers has been reduced from £7 to £6 per ton over the L.M.E. quotation, according to trade sources, reflecting the generally less satisfactory position of the zinc market.

Figures issued by the G.S.A. show that at June 30 10,722 s.tons of copper, 7,505 l.tons of tin, 221,991 s.tons. of lead and 223,928 s.tons of zinc were held in the supplementary stockpile. In large part, but not exclusively, these tonnages have been obtained through the barter programme.

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The British Bureau of Non-Ferrous Metal Statistics have issued the following figures for consumption (in tons) in the U.K. of the four non-ferrous metals for the month of August, with the corresponding July figures in parentheses :—

Consumption copper	40,920	(54,556)
End month stocks ...	152,898	(142,962)
Consumption tin ...	1,446	(1,747)
End month stocks ...	8,350	(8,697)
Consumption lead ...	24,816	(28,369)
End month stocks ...	74,876	(71,074)
Consumption zinc ...	21,501	(27,814)
End month stocks ...	70,637	(65,328)

OFFICIAL TURNOVERS

Official turnovers (in l.tons) for the week ending October 27, 1961, with the previous week's figures in parentheses, are :—

Copper	13,125	(14,500)
Tin	2,060	(2,740)
Lead	11,025	(6,625)
Zinc	5,825	(5,650)

Closing prices are as follows :

	October 26 *Buyers*	*Sellers*	November 2 *Buyers*	*Sellers*
COPPER				
Cash	£228½	£228¾	£228¾	£229
Three months ..	£229	£229¼	£229¼	£229½
Settlement ..	£228½		£229	
LEAD				
Current ½ month	£61½	£61¾	£62	£62¼
Three months ..	£62¼	£62⅜	£62¾	£62⅞
TIN				
Cash	£953	£954	£979	£980
Three months ..	£956	£957	£974½	£975
Settlement ..	£954		£980	
ZINC				
Current ½ month	£70½	£71	£71½	£71½
Three months ..	£71⅛	£72	£72¼	£72½

LONDON METAL AND ORE PRICES, NOVEMBER 2, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £230 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 6d. lb.
Cerium (99%) net, £16 10s. lb. delivered U. K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt. 12s. lb.
Germanium. 99.99%, Ge. kilo lots 2s. 8d. per gram
Gold, 250s. 2¼d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £660 per ton
Osmium, £17/£22 oz nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £27 7s. 6d./£27 17s. 6d.
Quicksilver, £60 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 80d. f. oz. spot and 80¼d. f'd.
Tellurium, 37s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis		30s. 0d./33s. 0d. per unit c.i.f.
Beryl (min. 10 per cent BeO)		270s./275s. per l. ton unit BeO
Bismuth		30% 5s. 6d. lb. c.i.f. 20% 3s. 3d. lb. c.i.f.
Chrome Ore—		
Rhodesian Metallurgical (semifriable 48%)	(Ratio 3 : 1)	£15 5s. 0d per ton c.i.f.
,, Hard Lumpy 45%	(Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%	.. ..	£11 0s. 0d. per ton c.i.f.
,, Smalls 44%	(Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Pakistan 48%	(Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite. Nigerian quality, basis 70% combined pentoxides (Ratio 10:1)	$Nb_2O_5 : Ta_2O_5$	150s./160s. 0d. per l. ton c.i.f. nom.
Lithium Ore—		
Petalite min. 3½% Li_2O		50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O		76s. 0d./80s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O		75s. 0d./85s. 0d. per ton f.o.b. Beira
Magnesite, ground calcined		£28 0s./£30 0s. d/d
Magnesite Raw (ground)		£21 0s./£23 0s d/d
Manganese Ore Indian—		
Europe (46%-48%) basis 60s. 0d freight		73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)		69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)		nom.
Molybdenite (85%) basis		10s. 0d. per lb. (f.o.b.)
Titanium Ore—		
Rutile Australian 95/97% TiO_2 (prompt delivery)		£27/£28 per ton c.i.f.
Ilmenite Malayan 50/52% TiO_2		£11 10s. per ton c.i.f.
Ilmenite Travancore 58/60% TiO_2		£15/£15 10s. per ton c.i.f.
Wolfram and Scheelite (65%)		118s. 0d./120s. 0d. per unit c.i.f.
Vanadium—		
Fused oxide 95% V_2O_5		7s. 6d./8s. per lb. V_2O_5 c.i.f
Zircon Sand (Australian) 66-67% ZrO_2		£16/£16 10s. ton c.i.f.

Mining Finance

A Handsome Output—500 Tons of Gold

Doornfontein, Libanon, Venterspost and West Driefontein are the four Gold Fields mines of the West Wits line. Together their contribution to the group profits is very substantial and, in fact, since 1950 they have produced together over 500 tons of gold and in the sixties output is certain to rise by over 50 per cent.

Perhaps the most outstanding point about this group of mines is the fact that, with the exception of Venterspost, each mine has increased its profitability per ton over the past five years and during the same period the total tonnage milled by the four mines has increased by over 30 per cent. The combined effect of these two factors is that the total working profits from gold alone have increased by almost 70 per cent. Unquestionably West Driefontein leads the field; in 1957 the working profit was R14,062,000, in 1961 it was R26,261,000. In September of this year the mine established a new profit record for the industry at R2,544,000.

West Driefontein

The new industry profit record is only one of the many that West Driefontein has set during the past year. In his statement, published on page 466, the chairman Dr. W. J. Busschau, has pointed to the fact that new records have been set in almost every phase of the operations—including taxation! However, judging by expansion projects in train West Drie is still far from its zenith. The overall expansion policy is to raise the production from the present level of 180,000 tons per month to 205,000 tons per month by July 1964.

The mine has two main reefs, the carbon leader and the Ventersdorp contact reef. Up until May of this year all of the mill tonnage came from the carbon leader reef and the increase in tonnage has been planned by the introduction of the V.C.R. In June the first tonnage from the V.C.R., some 45,000 tons, was milled thus bringing the monthly milling rate to 185,000 tons per month. The company is now working in preparation for a further increase of tonnage from the V.C.R., an additional 30,000 tons which will bring the mine total to 205,000 tons per month.

The equipping of the No. 4 Shaft is now in progress and development in this, the north-east corner, of the mine is due to start in January 1962. The carbon leader reef is not present in this area and thus all of the development work will be on the V.C.R. Development from the No. 5A shaft should also start in the immediate future, this work will be on the carbon leader reef.

During the year under review the main emphasis in the development work has been to replace the somewhat depleted reserves on the carbon leader reef and to establish sufficient reserves on the V.C.R. to support the current milling rate of 45,000 tons per month. The total ore reserves now stand at 4,091,000 tons, an increase of almost 800,000 tons from 1960. This figure includes some 731,000 tons on the V.C.R. The value of the carbon leader reserves is equivalent to 657 in.-dwt. compared with 460 in.dwt. on the V.C.R.

Expansion programmes invariably mean heavy capital expenditure and West Driefontein is no exception. During the past year the capital expenditure amounted to R7,600,000 and whilst Dr. Busschau has given no estimate for the current year it will probably be very similar. Certainly the expenditure during the first quarter was at this rate.

With such a high level of capital spending and the increasing demands of taxation there is little scope in the immediate future for increasing dividends. It is officially estimated that it will be possible to maintain the past year's rate (60.0 cents) during the coming year and that thereafter with reduced capital spending a further dividend increase may be possible.

After 1964, with a monthly tonnage of 205,000 a dividend rate of about 80 cents should be possible. The company's rate of tax is 10s. in the £ and thus this mine is particularly attractive to high tax payers. The London gross yield is at present 7.1 per cent; with full D.T.R. this yield can be improved to 13.9 per cent.

Doornfontein

During the past financial year to June 30, 1961, Doornfontein has completed the major part of its expansion programme. In January the milling rate was increased from 105,000 to 125,000 tons per month. As a result of this increase the working cost per ton milled has dropped from R6.12 in 1960 to R5.91 in 1961. During the September quarter, after the financial year end, the cost fell even further to R5.77 per ton milled.

The combined effect of this increased tonnage and reduced costs is the new high level of working profits at R6,022,000. Unfortunately, however, this increase is insufficient to meet both the growing taxation bill and the capital expenditure and therefore the chairman has warned shareholders that the dividend rate will be maintained at a slightly reduced rate during the current and the following few years.

The capital expenditure during the current year is estimated at R3,000,000

R.S.M. Association Dinner

THE seventy-seventh annual dinner of the Royal School of Mines Association was held at the Apothecaries Hall, London, E.C.2, on October 30 under the chairmanship of Mr. Peter Best, President of the Association.

In proposing the toast of the R.S.M. Association, Sir Andrew Cohen, Director General of the Department of Technical Co-operation, pointed to the challenge confronting both government and industry in Britain as regards the growing number of emergent countries to whom political power had been or was in the process of being transferred, but which still looked to Britain to provide technical assistance based on British know-how and British personnel. The demand for assistance in the technical development of these countries was increasing and Britain's problem was how best to help, how to make available the skilled men who could provide the leadership and technical advice required in the early stages of a new enterprise. Sir Andrew wondered whether in Britain we were yet organised to provide this kind of technical co-operation in the mining field. Did the right link exist between British know-how in geological surveying and mapping and prospecting on the one hand and mining engineering, mineral processing and the other technologies which went to make up the mining process? Was Britain in this respect as well equipped as were the French or the Germans or the Americans? It was in tackling these problems that he felt sure the Department of Technical Co-operation could count on the support and encouragement of the R.S.M. Association.

In his response the President assured Sir Andrew Cohen of the Association's interest and support but added that the problem was not merely one of the availability of British know-how and skilled personnel. It was also necessary to assure the newly independent countries that the people who could help them were indeed ready to do so and then to persuade them to utilise their services.

Turning to the affairs of the School of Mines itself the President referred to the extensive reconstruction of the School buildings which was currently in progress. It was good news that the expansion scheme had been planned on a scale which would provide not only ample scope for an increase in the number of students but also for the installation of a great deal more modern equipment than they had at present.

The number of Freshers had risen to 84 this Autumn compared with 67 a year ago, largely due to an increase from 17 to 30 among those reading mining. There had also been an interesting new addition to the curriculum which now provided a course on advanced mining dealing with the problems associated with deep mining. The scope of the new course in Mineral Technology had also been widened.

It was when he came to consider the practical training of young mining engineers during their early years of employment that the President wondered whether the industry was doing enough to provide facilities for the young engineer to gain the width and variety of experience under diverse mining conditions which was so important to his development. He suggested that it might be possible for the industry to devise some scheme whereby mining companies would exchange junior members of their staff for, say, six-month periods. Conceivably this might be a matter in which the help of Chambers of Mines in various areas might be enlisted.

In conclusion, the President referred to the publication of a new volume of the Register of Old Students which brought the 1947 edition up to date. Once again their very grateful thanks were due to their Secretary, Dr. Watson, who with his wife had undertaken this tremendous task.

The toast of the guests was proposed by Mr. D. T. Hudson, Vice-President of the Association, and it was responded to by Mr. R. H. H. MacWilliam, Director of Union Corporation.

and thereafter it is likely to remain at about R1,600,000 until the end of 1965 when the No. 2 shaft should be completed, full scale sinking is expected to commence in January 1962. The shaft, which is situated in the west-central area of the mine, will facilitate the development of the western area and in particular will give valuable information of the sub-outcrop of the carbon leader reef. Recently two boreholes have been drilled from the 15 level footwall horizon and have shown that, in fact, the sub-outcrop of the reef is further west than had been anticipated. But they have also shown that the reef has been displaced by faulting and there may be a loss of ground in the area.

Extracts from the chairman's statement are published on page 466.

Libanon

The sinking of the Harvie-Watt shaft was completed during the year under review and the equipping of the shaft is now almost complete.

The completion of this shaft will give access to the southern portion of the mine and particularly to the Ventersdorp contact reef. The results obtained on this reef have been particularly encouraging during the past year and the increase in the proportion of V.C.R. in the tonnage milled has increased the mill grade from an average of 4.7 dwt. in the 1959/60 financial year to 5.1 dwt. in the September quarter. This increase in the proportion of the V.C.R. as against the Main reef is also reflected in the ore reserve value which has been increased to 5.2 dwt. The value of the V.C.R. included in the reserve is 6.2 dwt.

With the completion of the Harvie-Watt shaft, the major capital expenditure programme has practically ended, though the sinking of the new ventilation shaft, will make certain demands on this account. Looking to the future the profit levels should rise and still further increases in dividends should be possible. It has been estimated by the chairman that Libanon will become liable for taxation in 1964.

Of considerable significance to Libanon is the West Wits borehole No. 21 result of 3,101 in.-dwt. on the V.C.R. and the most recent result on borehole No. 24 of 2,943 in-dwt. The indications in this area are that whilst there may not be sufficient new ground for a separate mine it could add considerably to the Libanon lease and would provide a major expansion to the south-east.

Venterspost

At Venterspost both the main reef and the Ventersdorp contact reef contribute to the mill tonnage and recently there has been a shift in emphasis, not so much from one reef to another but from the No. 1 shaft area in the north to the No. 3 sub-vertical shaft area in the far south. The results in this latter area have been sufficiently encouraging on both reefs to warrant a major re-orientation in the planning.

A new shaft from surface in the No. 3 sub-vertical area was at first considered to enable a better exploitation of the area but due to both cost and the time factor it has been decided to link this area with the No.'s 1 and 2 shafts by a system of trunk haulages. This system will provide considerable flexibility in both underground and surface handling arrangements and will also ensure that full use is made of the hoisting facilities at the existing shafts.

In total, this will mean the driving of some 13,000 feet of twin haulage. No cost estimates have been given for this work but it will be in the order of R1,000,000 which is certainly less than the cost of an additional shaft from surface, though it must be recognized that a shaft would have had other advantages.

Due to the strain on the waste rock hoisting facilities it has been decided to postpone the sinking of the No. 2B tertiary incline and therefore the money that would have been spent on this work is now available for the driving of the high speed haulages.

With the re-estimate of the ore-reserves as at June 30, the grade has been increased from 6.3 dwt. to 7.0 dwt. This increase has already been reflected in the mill grade which has now risen to 6.1 dwt. with a proportionate increase in working profits. Good dividends are being paid at present and despite the chairman's cautious statement they could well make further slight improvements.

SOUTH ROODEPOORT AND THE KIMBERLEY REEF

Whilst the development to date is still insufficient to warrant the inclusion of any Kimberley reef in the ore reserves the indications are definitely promising. At the annual meeting last year reference was made to underground boreholes which had intersected the Kimberley reef giving average values of 4.8 dwt. over 33 in. Subsequent development has confirmed these values and of 1,220 feet sampled, 35.2 per cent has proved payable at 4.23 dwt. over 50 in.

Over the past few years the general pattern at South Roodepoort has been rising cost levels and, despite a small increase in grade, falling profit margins. During the year under review, however, the combined effect of an increase in grade and the slightly higher price received for gold the profit has increased by R4,851. The dividend for the year has been maintained at 22.5 cents, equivalent to a yield of about 11 per cent on the Johannesburg price. The shares are no quoted on London.

Extracts from the chairman's statement are published on page 472.

HARTEBEESTFONTEIN AT DEPTH

Development in the north-west section of Hartebeestfontein has continued ex the 25 level haulage and the results during the past year have confirmed the indications that this deep area of the mine is showing a rising trend in values. To date some 72,000 feet have been sampled in this area giving 82 per cent payability with an average value of 407 in-dwt. and 25.25 in.-lb.

Stoping operations are now gradually being transferred to this deeper area and the improved values have arrested the fall in the mill recovery grade. The surface sorting rate has been increased slightly to 30 per cent. As this deeper area contributes even more to the total tonnage milled the grade should improve, without additional sorting to at least 10 dwt. This could be improved further still if the electronic sorter, at present being tested at Harties, proves successful.

Additional development in the south-west corner of the mine has disclosed an area which hitherto had not be regarded as mineable, it lies between the major fault and the Buffelsfontein boundary. In order to exploit the area it will be necessary to deepen the No. 1 shaft from 3,041 feet to 3,700 feet. A separate estimate of the cost of this work has not been given but the estimate for the capital expenditure for the current year is R3,300,000. This is almost R1,000,000 less than the previous year and will be spent mainly on completing the No. 4 shaft system.

In order to cover this capital expenditure and to make the final loan repayment of R1,800,000 to Anglo American next

(Continued on page 467)

London Market Highlights

Last week was a cheerful one in Mining share markets. Easily the firmest section of all was the Malayan tin group. The recent forced selling from Singapore gradually abated and was replaced by a growing local investment demand. At the same time the metal price moved ahead in anticipation of the approaching tight supply position. Shares prices responded accordingly. By Wednesday evening Gopeng had advanced 5s. to 43s., Ayer Hitam had put on 4s. 6d. to 44s. 6d. and there were rises of 4s. in Malayan (31s.) and Southern Malayan (32s. 6d.) Sharply increased profits and dividend from Kamunting raised these shares by 2s. to 19s. Amalgamated Tin of Nigeria, however, eased 6d. to 11s. 6d. on disappointment that their sharply higher profits had not been matched by the increase in the final dividend.

The week-end Press with its favourable comment on the recovery in South Africa's gold and foreign exchange reserves provided an excellent background for the Kaffir market. Monday morning ushered in buoyant conditions. Business broadened and the demand, particularly for the finance issues, was described as being of a genuine investment character. Union Corporation were prominent with a rise of 2s. 7½d. on the day at 53s. 9d. and Anglo American advanced 3s. 9d. to 136s. 3d. "Johnnies" were helped by the previous week's encouraging annual report and rose 2s. 3d. more to 44s. 9d.

Firmness in the O.F.S. and West Rand group mines was mirrored by gains in "Ofsits" and "Writs" of 2s. 3d. to 66s. 6d. and 1s. 3d. to 46s. 10½d., respectively. The older dividend-payers were not left out of the picture, although dealing conditions were made difficult by the lack of stock in several cases.

On Tuesday, however, the sudden revival of interest evaporated and for a while it looked as though a sharp reaction in prices would take place. But later in the day a modest return of buyers was sufficient to maintain prices at their advanced levels. Quietly steady conditions obtained on Wednesday, a feature being Dominion Reefs which put on 1s. more to 20s. 3d. in front of the chairman's forecast of higher dividends.

Rhodesian coppers were quietly firm, sentiment being helped by the restoration of order in Northern Rhodesia and the opening of the way for further constitutional negotiations. Nchanga improved 1s. 6d. to 44s. 9d. and helped by the satisfactory September quarterly, Chartered gained 1s. 3d. to 60s. 9d.

WEST DRIEFONTEIN GOLD MINING CO. LTD.

The Sixteenth Annual General Meeting of the abovementioned Company will be held in Johannesburg on November 10. The following is an extract from the Statement to Members by the Chairman, **Dr. W. J. Busschau :—**

The year under review was one of records; figures for tons milled, ounces produced, total working profit, taxation and dividends all reached new high levels. As a gold producer the mine has held its eminent position in the South African industry and it is interesting to note that its production in the year under review of over 1.49 million ounces was larger than the output for 1960 of any gold producing country in the free world other than the Union itself and Canada (about 4.6 million ounces), being more than countries like the United States of America (about 1.4 million ounces), Australia (about 1.1 million ounces), Ghana (about 0.9 million ounces) and Southern Rhodesia (roughly 0.6 million ounces).

The scheme for expansion of production progressed satisfactorily during the year under review. The milling of ore from the Ventersdorp Contact Reef commenced in April, 1961, and this reef contributed 45,000 tons of ore to the reduction plant in June, 1961.

The equipping of No. 4 Shaft with steelwork is in progress and development is scheduled to commence in January, 1962. The initial development will be directed towards the cutting of station layouts and cross-cutting to the Ventersdorp Contact Reef horizon. The 10 Level drive from No. 3 Shaft has holed with No. 4 Shaft and a limited footage is being developed on this level in connection with the rock-pass systems and cross-cutting.

At No. 5A Sub-Vertical Shaft development is expected to commence in the current quarter, and priority will be given to the station layouts, rock-pass systems and cross-cuts to the Carbon Leader horizon.

During the year under review the emphasis of the development programme has been placed on the development of sufficient ore reserves to replace those stoped on the Carbon Leader horizon, and the creation of sufficient ore reserves on the Ventersdorp Contact Reef to justify a milling rate of 50,000 tons per month from this horizon.

The progress made, during the past two years, in the programme for the expansion of production at the mine and the fact that production from the Ventersdorp Contact Reef commenced as planned, reflects great credit on the technical staffs at both the mine and head office.

The current year is one of preparation for the further expansion of operations on the Ventersdorp Contact Reef to the planned milling rate of 75,000 tons per month during the year ending June 30, 1964. This will involve heavy expenditure on the programme of shaft sinking which is vital in maintaining a balanced rate of production. Capital expenditure is, therefore, expected to remain at a high rate. It is desirable not to delay the capital expenditure programme as this is designed to increase the earning power of the mine and progress is now proceeding at a somewhat faster physical rate than was originally hoped.

The outlook for increased dividends must be considered against the background of this capital expenditure and the company's mounting liability for State's share of profit and taxation. During the past year, despite the high rate of capital expenditure, the company's liability to the treasury increased by R2.2 million when compared with the previous year. Unless there are changes in the formulae during the current year, the company's liability is expected to increase by an even greater amount.

The effect of Government receipts on distributable profits can be seen from the accounts. In round figures the net profit for the year was R27.7 million; of this the State took R3.5 million as State's share of profit and R9.2 million as taxation, a total of over R12.7 million (or about 46 per cent). Dividends were paid of R8.4 million and the balance of about R6.6 million was available for transfer to capital reserve as a counterpart of capital expenditure. The State's share of profit (R3,523,959) is an allowable deduction in the determination of taxable income as is the allowance for amortization and the full severity of the formula tax (R9,129,732) can be seen in the fact that it alone represented an effective rate of over 50 per cent on taxable income, an unusually high rate for a company even in the present world.

Against this background the prospect for the present year is one in which it is hoped to maintain the level of half-yearly dividends reached in June, 1961. Thereafter with some reduction in the rate of capital expenditure dividends may be expected to show further improvement.

DOORNFONTEIN GOLD MINING CO. LTD.

The Fourteenth Annual General Meeting of the abovementioned Company will be held in Johannesburg on November 10. The following is an extract from the Statement to Members by the Chairman, **Mr. W. M. Walker :—**

During the year under review good progress was made with the scheme for increasing the rate of production to 125,000 tons per month and by the end of the year the necessary alterations and additions to the reduction plant had, to all intents and purposes, been completed. During the first six months of the year the milling rate remained constant at 105,000 tons per month but, as from January, 1961, the rate was gradually increased and by the end of the year the reduction plant was being operated at its maximum capacity of 125,000 tons per month.

Shaft Sinking, Plant and Equipment

No.1A Sub-Vertical Shaft was sunk 1,764 feet to a depth of 3,124 feet below 15 Level collar. Stations to serve 25, 27, 29, 31, 33 and 35 Levels were cut and supported and the shaft was equipped to a depth of 3,000 feet. Development is scheduled to commence from this shaft during January, 1962, and will initially be directed towards the cutting of the rock-pass systems and station layouts, and cross-cutting to the Carbon Leader reef horizon on the various levels.

At No. 2 Shaft site the excavations for the foundations of the shaft collar and the concrete headgear were commenced in November, 1960. Full scale sinking of this shaft, which is 26 feet in diameter and will be sunk to a depth of approximately 6,000 feet below surface, will be started early in January, 1962, and it is expected that the shaft will be commissioned by December, 1965.

Development and Ore Reserve

During the year two boreholes were drilled from 15 Level footwall drive west in the vicinity of the position of No. 2 Shaft.

The first borehole intersected the Carbon Leader at a point 8,800 feet to the west of a north-south line through No. 1 Shaft and 70 feet north of the line through the drive. The reef was intersected approximately 100 feet below 15 Level horizon and sampling results averaged 30.2 dwt. per ton over a borehole reef width of 15.0 inches, equivalent to 453 inch-dwt.

The second borehole intersected the Carbon Leader at a point 10,150 feet west of a north-south line through No. 1 Shaft and 1,500 feet north-north-west of the position of No. 2 Shaft. The reef was intersected about 250 feet below 15 Level horizon and sampling results averaged 6.2 dwt. per ton over a borehole reef width of 8.0 inches, equivalent to 50 inch-dwt. In the case of this borehole some of the core was lost due to grinding.

Although the results obtained from these boreholes have shown that the sub-outcrop of the Carbon Leader is situated further to the west than was thought to be the case twelve months ago, they have also indicated that the reef has been displaced by severe faulting which may have caused large losses of reef-bearing ground. It will not be possible, however, to assess the effects of the faulting until such time as development work can be undertaken from No. 2 Shaft.

General Review and Outlook

In consequence of the excellent progress made with the expansion programme at the mine, which reflects great credit on the technical staffs at the mine and at head office, the tonnage milled during the year was 157,500 tons greater than that milled during the previous year. Furthermore, the yield of gold increased by 0.201 dwt. per ton milled while working costs decreased by 21.6 cents per ton milled. As a result of these improvements, the working profit from gold production for the year was R1,334,091 more than that in respect of the previous year. Nevertheless, as was envisaged in my statement for the year ended June 30, 1960, this expected increase in working profit was insufficient to offset the increase in the rate of expenditure on capital account which stemmed from the decisions to start sinking No. 2 Shaft and to increase the milling rate to 125,000 tons per month. This, together with the fact that, during the year, the company became liable for the payment of formula tax for the first time, gave rise to a marked reduction in the profit available for distribution and the payment of dividends totalling 27 cents per share resulted in a material reduction in the balance of the appropriation account.

Subject to the qualification that it is impossible to assess accurately the trend of working costs and ore reserves, it may be said that now that the reduction plant is being operated at its full capacity of 125,000 tons per month the present prospect is one of stable working profits somewhat greater than the profits obtained during the year ended June 30, 1961. Expenditure on capital account

during the current financial year will probably be slightly in excess of R3 million but, thereafter, is likely to remain at about half that amount each year until the completion of No. 2 Shaft.

As has been mentioned previously, the company became liable for formula tax during the year under review, the amount payable having been estimated at R861,995. The full impact of formula tax, however, has yet to be experienced, but it is expected that it will be felt during the current financial year. Furthermore, it has now been estimated that the company will become liable for the payment of State's share of profit during the current year, although it does not appear to be likely that the amount payable will be very large.

Allowing for the possible trends of working profits, capital expenditure and Government receipts, the outlook for dividends now appears to be one of maintaining distributions at a slightly reduced level during the current and the following few years.

LIBANON GOLD MINING CO. LTD.

The Twenty-fifth Annual General Meeting of the abovementioned Company will be held in Johannesburg on November 9. The following is an extract from the Statement to Members by the Chairman, **Mr. L. T. C. Pitt :—**

A satisfactory supply of Native labour enabled the ore milled to be increased over the previous year by 55,000 tons to 1,405,000 tons during the year under review. This increase in the tonnage milled and the increase in yield of 0.123 dwt. per ton milled from 4.717 dwt. for the previous year to 4.840 dwt. increased the total revenue. The full benefit of the higher yield, however, was slightly offset by an increase of R0.069 per ton in working costs to R4.851 per ton but the working profit showed an increase of R0.125 per ton over the previous year to R1.250 per ton.

The availability of sufficient Native labour enabled the development footage advanced to be increased from 78,152 feet for the previous year to 80,931 feet for the year under review. The payability of footage sampled was 75.2 per cent compared with 68.4 per cent for the previous year. The average value obtained was 313 inch-dwt.

This includes work in the north-western portion of the mine held under prospecting permit endorsed for stoping operations.

The ore reserve at June 30, 1961, increased by 187,000 tons to 2,759,000 tons during the year and the value increased by 0.2 dwt. to 5.2 dwt. per ton. The higher proportion and value of the Ventersdorp Contact Reef at 6.2 dwt. per ton has resulted in the higher average value of the ore reserve. The value of the Main Reef remains the same at 4.8 dwt. per ton.

The Harvie-Watt Shaft was sunk 651 feet to its final depth of 6,590 feet and the remaining stations were cut. Equipment of the shaft was commenced and by the end of the year under review had reached a depth of 5,584 feet.

In June, 1960, by arrangement with Venterspost Gold Mining Company Limited, Libanon was provided with upcast ventilation facilities but Venterspost has recently found it necessary to restrict sooner than was anticipated the volume of upcast air for Libanon and this has brought forward the need for Libanon to provide sufficient independent upcast capacity to improve ventilation conditions in the No. 1 Sub-Vertical area.

It has been necessary, therefore, to proceed with the sinking of a vertical upcast shaft 22 feet in diameter situated near the western boundary of the property. This shaft, the No. 1 Ventilation Shaft, will be aproximately 2,400 feet deep and is estimated to cost R876,000. Installation of the shaft collar and of the sinking equipment has been commenced.

Net expenditure on capital account for shaft sinking, plant and equipment totalled R1,286,848. The major portion of this expenditure was on the Harvie-Watt Shaft now nearing completion. It is expected that the capital expenditure for the current year will be less.

In the late Mr. Barclay's review last year he referred to the encouraging results which had then been obtained on the Ventersdorp Contact Reef horizon in the southern portion of the mine. An increase in the ore obtained from this source during the year and the first quarter of this year has materially increased the average value of the milled tonnage. Further development on this horizon continues to give encouraging results and, although there is still much development work to be done, the indications are that good values from this reef will be maintained. It will be appreciated that the completion of the Harvie-Watt Shaft increases both the hoisting and the ventilation capacities of the mine and thereby will particularly facilitate future development of that area.

Increase in depth of workings must inevitably increase working costs but it appears from all indications that, provided there is no major change in labour conditions, and the cost of stores, profits should rise.

It should be borne in mind, however, that according to present expectations your Company will in 1964 become liable for formula tax.

At the South African section of the Seventh Commonwealth Mining and Metallurgical Congress, held earlier this year in South Africa, sixty-five papers were presented. These papers are being published in a limited edition in three volumes, together with the highlights of the discussion on each paper. They are obtainable from The South African Institute of Mining and Metallurgy, Box 1183, Johannesburg.

The total dividends for the first nine months of the current year by all industries in Canada amount to $588,000,000. Of this figure the mining industry has contributed $103,200,000, equivalent to 17.6 per cent. Despite the rise in the total payment from $529,300,000 for the corresponding period in 1959 the contribution of the mining industry has increased. In 1959 and 1960 the mining contribution was a little over 14 per cent.

MINING FINANCE—*Continued*

June, further loans totalling R2,300,000 have been raised during the past year by building society bonds. With these loans it should be possible for Harties to meet all its commitments without reducing the current dividend rate.

During the year ended June 30, 1961 dividends totalling 50.0 cents per share were paid. On the current London price of 43s. this gives a gross yield of 11.3 per cent. (The Johannesburg price is 550 cents.) As yet no official tax rate for Hartebeestfontein has been given for the current year it will be in the order of 6s. in the £ and therefore Harties is now entering the group of mines which are particularly interesting to the British high tax payer. To an investor with an *effective rate* of at least 6s. in the £ the gross yield of these shares can be increased to 14.9 per cent through D.T.R.

Extracts from Mr. Bernstein's annual review are published on page 469. The meeting will be held in Johannesburg on November 28.

CHARTERED DIVIDEND

As had been anticipated the B.S.A. mineral royalties in the September quarter have shown a decrease as compared with the same period of the previous year. Over the full financial year to September 30, 1961 the royalties have fallen by £1,516,000. However, this drop should not be sufficient to encourage the directors to reduce the dividend.

The only point which remains in doubt is whether the dividend will be increased sufficiently to counteract the increased Federal taxation in order that the net dividend might be maintained. As the Chartered dividends are declared gross it is perhaps unlikely that an increase will be made.

EASTERN TRANSVAAL CONS.

In the financial year ended June 30, 1961 the non-mining activities of Eastern Transvaal have proved to be even more of a burden then was the case twelve months earlier. The loss on the afforestation and sawmilling has increased from R167,054 to R192,175 and the loss on farming has only been reduced by some R4,000.

Due mainly to a fall in the mill grade at the mines which has only been partly offset by a reduction in working costs the profit on the mining operations has been reduced by R33,469 to R326,784. Overall the excess of revenue over expenditure has been reduced from R189,432 to R138,546. The dividend has been maintained at 5 per cent absorbing R107,917.

SAAIPLAAS DISAPPOINTS

Production started at F. S. Saaiplaas in January of this year, the first profits were earned in March, and the mine can now be described as on its way. The main question to be asked, however, is just where is it heading ?

In his annual statement to members the chairman, Mr. J. M. M. Ewing, has disclosed that the gold values obtained in recent development are not sufficient for the company to progress at the rate that had been anticipated this time last year. It now seems unlikely that the company will be able to repay its indebtedness by June 1965 as planned.

(Continued on page 469)

VENTERSPOST GOLD MINING CO. LTD.

The Twenty-seventh Annual General Meeting of the abovementioned Company will be held in Johannesburg on November 9. The following is an extract from the Statement to Members by the Chairman, **Mr. J. W. A. Wright** :—

The main feature of the operating results for the year under review is, once again, an increase in yield, emanating mainly from the higher value of the ore reserve as estimated at the end of June, 1960, and also from the larger proportion of tonnage milled from ore reserves.

The working profit at R1,973,127 was higher by R472,601 and while this figure of working profit is by no means a record one it is perhaps worth noting that in the 22 years that the mine has been in production it has only been exceeded in the years ended June 30, 1950, and 1951, when the immediate benefits of the increase in the price of gold, which took place in the latter half of 1949, were felt. In these particular years, however, working costs amounted to only R3.19 and R3.49 per ton milled, respectively, compared to last year's figure of R5.87 per ton milled.

Attention is drawn to one particular aspect deriving from the development results which has led to a major revision of the future underground rock handling and ventilation arrangements.

Members may recall that in my review a year ago, I commented upon the necessity not only of bringing ore to the mill proportionately to the quantity of each reef comprising the ore reserve, but also of planning future development of the intact tonnage on each reef so as to make balanced operations possible. A glance at the surface and underground plans, accompanying the Annual Report, will enable members to appreciate more readily the location of the shaft systems serving the mine. In the northern sector lies the No. 1 Shaft system adjacent to which is situated the mill and the reduction works, while in the centre of the mine lies the No. 2 Shaft system. Both of these systems extend from surface and the ore hoisted at No. 2 Shaft is transferred to the mill by means of a surface rail system. In the southern sector, and lying to the south of the main Johannesburg-Cape Town railway line, lies the No. 3 Sub-Vertical Shaft which is connected underground to the No. 2 Shaft workings but has no other access to surface except for ventilation purposes.

In the No. 1 Shaft area, development on the Main Reef at depth has proved erratic and disappointing and is, at present, confined mainly to the advancement of off-reef footwall drives, on 22 and 24 Levels from where the reef is tested either by diamond drill-holes or cross-cutting. Development on the Ventersdorp Contact Reef in this Shaft area continues to be good and work on this horizon, in the meantime, is restricted to that sufficient only to maintain the correct proportion of this Reef in the ore reserve.

In the No. 2 Shaft area where the Main Reef is the principal orebody, development from the No. 2B Tertiary Incline Shaft has to date, produced a limited tonnage of marginal ore.

In the No. 3 Sub-Vertical Shaft area development on both the Main Reef and the Ventersdorp Contact Reef has been so encouraging as to cause a major alteration in planning. On the Main Reef satisfactory tonnages of higher than average grade ore have been disclosed while on the Ventersdorp Contact Reef development has provided further proof of the extension of good values, both laterally and on dip.

I have detailed these facts at some length in order that members may appreciate more readily the problem which confronted the Company's Technical Advisers. Following the disclosures in the No. 3 Shaft area and the disappointing Main Reef development in the No. 1 Shaft area, it became evident, from latest estimates of intact tonnages, that in order to maintain balanced operations between the two reefs more tonnage would require to be produced from the No. 3 Shaft area than previously had been estimated. In other words the encouraging development in the No. 3 Sub-Vertical Shaft area indicated that concentration of operations would be thrown on the No. 2 Shaft system, the scale of which could not have been foreseen, and with which neither the existing ventilation nor rock handling facilities could cope.

An apparently simple solution would have been to sink a shaft from surface to link up direct with the No. 3 Sub-Vertical Shaft but this was ruled out not only on the ground of cost, with the added complication of having to cross the main S.A.R. and H. railway line in order to connect up with the mine's own surface railway system, but it was also considered unfeasible on account of the time factor as such a shaft could not have been sunk in time to have maintained a balanced rate of depletion from the various sections of the mine. The Technical Advisers finally recommended, and your Board accepted this recommendation, that the necessary improvements should be effected by driving two 10 feet wide by 11 feet high haulages on 10 Level between No. 3 Sub-Vertical and No. 2 Shafts, a distance of 8,000 feet, and a second haulage of similar dimensions and on the same level between No. 2 Shaft and No. 1 Shaft, which would necessitate 5,000 feet of new development. These haulages will provide direct access between No. 3 Sub-Vertical Shaft and either No. 2 or No. 1 Shafts as required and by these means a flexibility of underground handling arrangements will be provided. Further, the hoisting facilities available at No. 1 Shaft, in which vicinity it will be remembered the mill is located and which might have become semi-redundant on account of the poor Main Reef development in that area, will continue to be used to full capacity. The haulages are designed for high speed travel and when completed will be capable of transporting men and material or ore and waste as required.

The ore reserve fully developed at June 30, 1961, was estimated to be 2,265,000 tons (1,177,000 tons Main Reef and 1,088,000 tons Ventersdorp Contact Reef) averaging 7.0 dwt. over a stoping width of 55.6 inches. This shows a modest increase of 75,000 tons compared to a year ago, the value and width being higher by 0.7 dwt. per ton and 0.7 inches, respectively. Of this increase 14,000 tons is on Main Reef, on which horizon the average value has increased from 4.5 to 4.8 dwt. per ton and the width has increased from 57.9 to 58.2 inches, while the balance of 61,000 tons is on the Ventersdorp Contact Reef where the average value has increased from 8.5 to 9.5 dwt. per ton and the width has increased from 51.9 to 53.0 inches. With so much of the development being directed entirely towards the establishment of the haulages previously referred to these results can be considered very satisfactory and the overall increase in average value of 0.7 dwt. augurs well for the future.

With development taking place in the area served by the now fully operational No. 3 Sub-Vertical Shaft and with the additional strain, occasioned by the handling of the rock produced from the excavation of the twin haulages referred to above, on the limited hoisting facilities at No. 2 Shaft it has been decided to defer for the time being the further sinking of No. 2B Tertiary Incline Shaft. As reported a year ago, preliminary work had commenced on the second stage of this shaft which was to sink the shaft from 23 to 25 Level and, before work was suspended, sufficient had been done to enable the Main Reef to be stoped from 23 Level with the aid of temporary loading facilities. This decision to defer sinking, while rendered necessary in order to conserve hoisting capacity, also means that the expenditure which would have been incurred on the extension of the shaft will, for the present, be diverted to meet the costs involved in driving the high speed haulages so that overall, the annual rate of expenditure on these works which are essential to develop fully the southern half of the mine, will be no greater than previously estimated.

As it is essential, in order to maintain balanced operations, that development on the Main Reef is not allowed to lag too far behind that on the Ventersdorp Contact Reef, sinking of the No. 2B Tertiary Incline Shaft is expected to be resumed in the first half of the 1962/1963 financial year in order to provide points of attack on the Main Reef. Apart from this, so far as can be seen at present, the only other major shaft work likely to be required in the future will be some extension to depth of the No. 3 Sub-Vertical Shaft system. Development from this shaft is not yet sufficiently far advanced for a decision to be made as to whether such an extension, in fact, will be necessary or not but should it be warranted the present thoughts of the Technical Advisers are that work should be commenced early in the 1963/1964 financial year.

With the increase in the value of the ore reserve at June 30, 1961, some further increase in the average yield and in profits should occur during the current year as is in fact evidenced by the results for the first quarter quoted above. Working costs, however, continued to reflect an upward trend.

Provided operating results come up to expectations and are not influenced too seriously by problems of labour supply and rising working costs the prospect is that it should be possible to maintain the current rate of dividend.

Board Changes

Mr. J. F. E. Smith, a managing director of Smith, St. Aubyn and Co. the London discount house, has joined the board of directors of The Discount House of South Africa Limited.

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The Central Provinces Manganese Ore Co. announce with regret that Mr. H. R. Holmes has resigned his seat on the board after 56 years with the company.

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Professor J. C. Mitcheson has been appointed chairman of the Geological Survey Board, in succession to Sir Walter Drummond. Professor Mitcheson, Dean of the Royal School of Mines, has occupied the chair of Mining since 1953.

HARTEBEESTFONTEIN GOLD MINING CO. LTD.

(Incorporated in the Republic of South Africa)

HIGHER DEVELOPMENT VALUES OBTAINED
MR. B. L. BERNSTEIN ON NOTABLE ACHIEVEMENTS

The 12th Annual General Meeting of Hartebeestfontein Gold Mining Company Limited will be held on November 28 in Johannesburg.

The following is an extract from the circulated review of the chairman, **Mr. B. L. Bernstein :**

In my review last year I indicated to shareholders that reef development in the north-western or deep level area of the mine was showing a rising trend in gold values. This trend has continued to the extent that, during the year under review, higher development values have been obtained in the deep area than in the shallow area. The effect of this has been to arrest the decline in gold recovery grade which followed the gradual transfer of stoping operations from the shallow to the deep area. The total development accomplished in the deep area up to September 30, 1961, amounted to 214,328 feet. Of this footage 72,035 feet were sampled and 81.7 per cent thereof proved payable with an average value of 407 inch-dwt. of gold and 25.25 inch-lb. of uranium oxide. The high development rate which was required to open up the deep area has been gradually reduced from 11,000 feet to 7,600 feet per month. This rate is commensurate with current stoping requirements and is considered adequate to maintain the ore reserve which, on June 30, 1961, was estimated at 4.7 million tons, an increase of 1.7 million tons over the corresponding figure on June 30, 1960. At present the deep area provides about 50 per cent of the ore sent to the mill.

Shaft Sinking Progress

Satisfactory progress has been made with the sinking of No. 4 shaft, which is required to serve the mine below the 29th level. At the annual general meeting in November last year, I mentioned that a record footage of 1,106 feet sunk and lined was attained during the calendar month of October, 1960. To this can now be added the notable achievements of 3,110 feet in 100 days and 5,025 feet in six consecutive months. Vaal reef was intersected in No. 4 shaft during August, 1961, at a depth of 6,656 feet. The average values obtained were 187 inch-dwt. of gold and 22.05 inch-lb. of uranium over a channel width of 35.8 inches. On September 30, 1961, the shaft had reached a depth of 7,154 feet, approximately 268 feet above its planned depth. Since April, 1961, the sinking rate has decreased considerably. This is due to the cutting of main stations and to increased depth which necessitated the removal from the sinking stage of the mechanical loading equipment which was replaced by caterpillar loaders operating in the bottom of the shaft. Main stations have been cut on all levels from the 27th level to the 34th level. At a depth of 6,406 feet the shaft was holed into the 29th level haulage, which had been advanced from No. 2A shaft. Provision has been made for the installation of an underground winder to hoist rock to the 29th level, where it will be transported for hoisting to surface in the No. 2 shaft system. The necessary excavations in the vicinity of the shaft for this underground winder have been completed.

In the shallow area of the mine, served by No. 1 shaft, development in the south-west corner has disclosed a somewhat larger mineable area than was previously anticipated. This lies between the major faulting to the north and the common boundary with the Buffelsfontein mine to the south. To facilitate the mining of this area, arrangements have been put in hand to deepen No. 1 shaft from 3,041 feet to 3,700 feet below the collar. At the same time it is planned to advance a crosscut from No. 3 shaft towards borehole HB 20 to explore a block of ground, which, in elevation, lies midway between the deep and shallow areas. If the extent and value of this block warrant exploitation then access to it can be obtained by deepening No. 1 shaft a further 600 feet.

The milling rate was increased during the year under review from 120,000 tons to 136,000 tons per month. It is considered that a throughput of 136,000 tons per month is the optimum for both the gold and uranium plants under present conditions and is sufficient to ensure that the uranium quota will be fulfilled. The tonnage which has to be mined to maintain this rate of milling is of the order of 228,000 tons per month.

Uranium Oxide Production

During February, 1961, a press announcement was made regarding new arrangements for the production of uranium oxide. These arrangements are dealt with fully in the directors' report. In brief, your company has acquired, against royalty payments, certain production quotas from other producers and will continue to produce uranium oxide under contract until 1970. The company's quota, together with the quotas acquired, has been fixed at a total of 4,641 short tons. Interest-free loans will be made to the company quarterly until December 31, 1966, the date on which the original contract would have expired, and will be repayable during the years 1967 to 1970. These loans should ensure that the net amount available from uranium for dividends during the period of the original contract will be much the same as they would have been had the new stretch-out arrangements not been made. Six uranium producers in all have made arrangements for their contracts to run until the end of 1970 by which time it is hoped that other markets for uranium oxide will have developed. The Atomic Energy Board is proceeding with its R8 million research programme, half the cost of which is being met by the uranium industry in annual contributions of R800,000 until March 31, 1964. Your company contributes towards this expenditure.

Higher Working Profits

The combined working profit from gold and uranium increased by R50,962 as compared with the previous year. Uranium royalties of R1,442,700 for the period January to June, 1961, were paid by the company and provision has been made for taxation and lease consideration at the slightly reduced figure of R4,138,102. Dividends totalling R4,500,000 (50 cents per share) were distributed and an unappropriated balance of R1,826,439 has been carried forward to 1962. During the year loans of R2,300,000 were raised by means of building society bonds over some of the houses and flats owned by the company. Repayment of these loans will be made in monthly instalments over a period of approximately twenty years.

Capital Expenditure

The principal items of capital expenditure, which totalled R4,213,359 during the period under review, were the cost of sinking and equipping No. 4 shaft, development and underground equipment in the deep area of the mine, mine buildings and plant, additional accommodation for the Native labour force and extensions to the reduction and uranium plants. It is estimated that during the current year capital expenditure will be approximately R3,300,000 and this will be spent principally on the completion of the No. 4 shaft system.

A brief review of the financial results for the six years since the mine commenced production is shown in the tabulation accompanying the directors' report. During these years profits have totalled some R64 million and dividends have totalled some R26½ million, or R2.95 per R1 share. Approximately R27 million (or 58%) of the total capital expenditure of the mine has been financed from profits, thus keeping the issued capital at a relatively low figure. Taxation and the share of profits payable to the State have absorbed a further R9 million in the past three years.

MINING FINANCE—*Continued*

It has been decided to increase the milling rate to 75,000 tons per month by January 1962 and to hold it at that rate, with development at 6,000 feet per month, until such time as the development results improve. The planned increase in tonnage to 100,000 tons has therefore been postponed almost indefinitely.

It has been emphasized in the report that although these decisions have been taken due to the existing development results, in fact, very little of the lease area has been developed and it is really too early to abandon the expectation that future development results will improve towards the levels indicated by the drilling programme.

REDUCED TONNAGE AT RAND LEASES

Both the ore reserve tonnage and the grade have been declining at Rand Leases for some time and the decision has now been taken to reduce the tonnage milled from the current level of 190,000 tons per month to 130,000 tons. This reduction in tonnage will take place in the current quarter when it is hoped that " better results " will be obtained. This decision has been forced upon the company, not so much by rising costs but by falling mill grade. It is, in fact, to the company's credit that the cost levels have remained very constant.

The mill tonnage will be held at this reduced figure for only a limited period and thereafter further reductions will probably be necessary. Rand Leases have been making capital repayment since 1959 and to date 32.5 cents have been repayed. No firm estimate of the profit from treating the remaining ore reserve can be made but it should be sufficient together

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RAND LEASES (VOGELSTRUISFONTEIN) GOLD MINING CO.

(Incorporated in the Republic of South Africa)

MR. S. G. MENELL'S REVIEW

The 29th annual general meeting of Rand Leases (Vogelstruisfontein) Gold Mining Company Limited will be held on November 27 in Johannesburg.

The following is an extract from the circulated review of the chairman, **Mr. S. G. Menell :**

The tonnage milled during the year under review was 2,272,000 tons, an increase of 46,500 tons compared with the previous year. Once again the increase in milled tonnage was attributable to the increased Native labour force which was available to your mine. Working costs decreased by 0.5 cent to R3.541 per ton and the recovery grade, at 2.787 dwt. per ton, was 0.209 dwt. lower than in the previous year. The total working profit was 0.5 cent per ton milled, a decrease of 23.6 cents per ton compared with the previous year.

The total working profit for the year, including sundry non-mining revenue, was R81,969 (*1960—R641,254*). Appropriations for capital expenditure totalled R83,882. No taxation is payable in respect of the current year, but an amount of R1,608 has been appropriated for additional taxation payable in respect of previous years. Capital repayments No. 4 and 5 of 5 cents per share each, were paid to members during the year, leaving a balance of 65 cents per share repayable as and when decided by your board. As at the end of the year under review, your company had made capital repayments totalling R1.17 million (R0.32½ per R1 share) to members.

Development

During the year under review, development on the Main Reef Series below the 36th level, including the area tributed from Durban Roodepoort Deep, Limited, totalled 22,093 feet. Of 8,885 feet sampled, 5,455 feet, equivalent to 61.4 per cent, proved payable at an average value of 13.26 dwt. per ton over a channel width of 24.2 inches, equivalent to 321 inch-dwt. In the tribute area 14,917 feet of development were accomplished of which 5,615 feet were sampled. Of this footage, 3,735 feet, equivalent to 66.5 per cent, proved payable at an average value of 16.04 dwt. per ton over a channel width of 22.5 inches, equivalent to 361 inch-dwt. Some development remains to be done in the tribute area, most of which should be completed during the present financial year.

Since the commencement of operations in 1936, 52.1 million tons of ore have been milled yielding 8.9 million ounces of gold, the working profits totalled R36.6 million, and members received R15.3 million (R4.72½ per R1 share) by way of dividends. The payable ore in the mine's claim area is being rapidly depleted and at the beginning of the current financial year the ore reserve in this area totalled 1,452,000 tons of which 645,000 tons contained in shaft and safety pillars, are not available for extraction at this stage.

In order to prolong the life of your mine, negotiations on a tributing basis were concluded with the holders of the mineral rights, Durban Roodepoort Deep, Limited, for the right to prospect and mine on all reef horizons, except the Kimberley Reef, in a triangular area of ground, approximately 127 claims in extent, along the eastern portion of the southern boundary of your mine. Since January, 1959, when the tribute area was first entered and up to June 30, 1961, a total of 26,684 feet of development was accomplished and of 13,030 feet sampled, 57.9 per cent was payable at 350 inch-dwt. At the beginning of the current financial year the ore reserve in the tribute area amounted to 288,000 tons at 5.22 dwt. per ton, but despite this tonnage, the total ore reserve of the whole mine at June 30, 1961, was 1,740,000 tons, a decrease of 357,000 tons compared with that at June 30, 1960. It is anticipated that during the present financial year the ore reserve will decline still further.

Members are aware that west of No. 1 tertiary shaft, which extends to just below the 42nd level, the bottom level of the mine, the reef dips very steeply and payability is of a low order. Any exploration of the ground below the 42nd level, either in the mine's own claim area or in any possible extension of the tribute area, would require the expenditure of large capital amounts on shaft sinking and air-conditioning plants. Your board considers that this capital expenditure is not warranted under present conditions.

In my review last year, I referred to a borehole which had been drilled from the end of a crosscut on the 42nd level to obtain structural information of the south-western portion of the mine. This borehole traversed alternations of quartzites and granite and was finally abandoned when, at 1,910 feet it entered a dyke in which it was likely to remain until it reached the boundary of the company's mining area. Your board still has under consideration the possibility of further exploration of this area.

Contraction of Operations Proposed

Since 1958 I have repeatedly referred to the fact that milling at the rate of 180,000 tons per month could be maintained for a limited period only. During the past seven months working losses have been incurred, at an average milled tonnage of 191,000 tons per month. The prospects of continuing to mine such large monthly tonnages economically from the mine's own claim area, from the tribute area or from any possible extensions to the tribute area, are not attractive and your board has decided that better results are likely to be obtained at a tonnage level of approximately 130,000 tons per month for a limited period, and thereafter a further curtailment may be necessary. This decision will be implemented and after the first quarter of the present financial year, the tonnage milled will be progressively reduced to 130,000 tons per month.

The contraction of operations will necessitate a reduction of the labour strength. Every effort will be made to find alternative employment for the redundant personnel and to reduce any hardship which may result from the curtailment of operations. Steps have already been taken to effect a reduction in the Native labour complement consistent with the requirements of the mine at the various tonnage levels.

EASTERN TRANSVAAL CONSOLIDATED MINES, LIMITED

(Incorporated in the Republic of South Africa)

MR. B. E. HERSOV'S REVIEW

The 36th annual general meeting of Eastern Transvaal Consolidated Mines, Limited, will be held on November 21 in Johannesburg.

The following is an extract from the review by the chairman, **Mr. B. E. Hersov,** which has been circulated with the report and accounts.

The excess of revenue over expenditure of the various activities of your company for the past financial year amounts to R283,494 being R9,432 less than the results for the previous year. A profit of R59,583 resulted on the sale of certain assets which, with the write back of R8,000 of a provision on valuation of timber stock, gave a total profit of R351,077 for the year.

Consequent upon the sale of a portion of the company's forestry assets for R600,000, details of which transaction were given to members by circular, and as a result of the writing down of the investment in the subsidiary company, Frantzina's Rust Timber Plantations Limited, it became necessary to effect an adjustment to the capital reserve account in respect of an aggregate amount of R436,983 previously appropriated from profits and now recouped. The total recoupment of R436,983 was transferred to the credit of the revenue and expenditure account and an amount of R144,605 for capital expenditure during the year was set off against it.

Of the sum of R436,983 an amount of R192,104 relates to the book value of the forestry assets sold. The book value of the current assets sold under the same transaction amounted to R356,922, making a profit of R50,974 (subject to adjustments on completion of the land survey) which, added to a profit of R8,609 on sundry other items sold during the year, resulted in the above-mentioned profit of R59,583.

An amount of R300,000 has been appropriated to augment the general reserve to R545,802.

A dividend of 5 per cent. (2.5 cents per share) amounting to R107,917 was declared to members registered on June 30, 1961, which is the same amount as last year.

Mining

The total ore reserve at your company's operating mines increased by 32,800 tons to 262,000 tons but the value declined by 1.83 dwt to 13.22 dwt per ton.

At the New Consort mine, the Prince Consort shaft has been equipped to the 37th level for the lowering and raising of men and material and for the hoisting of rock. An investigation is proceeding to ascertain whether additional old slimes dams can be profitably treated.

A tributing agreement with an option to purchase is being finalized in respect of the Clutha Mine, situated in the vicinity of the New Consort mine. Reconditioning, equipping and underground development are in progress to evaluate the potentialities of this mine.

At the Sheba mine prospecting is in progress in the Zwartkopje zone.

The Woodbine shaft at the Agnes mine has been reconditioned and re-equipped

to 70 feet below the 11th level. To expedite a holing, a shaft raise is being developed from the 17th level and at the end of September 1961 had been advanced 126 feet.

During the year the Golden Hill mine which is adjacent to the Agnes mine was entered by means of an adit on the second level. Most of the old workings have been re-sampled and underground prospecting development will commence in due course.

Certain of the assets of the Mamre mine, which ceased operations at the end of April 1960 are being disposed of and up to the end of the financial year under review had realized R27,786.

Plantations and Sawmilling

After the abovementioned sale your company's remaining plantations comprise approximately 79 acres of pine and 949 acres of gum in the Barberton area, and 3,960 acres of pine and 174 acres of gum at Mamre in the Carolina district. The Barberton block will continue to be operated for mining timber and the Mamre block for sawmill logs sold under a long-term contract to a company, in which your company has no financial interest.

The disposal of sawmill equipment and plant which have now become surplus to the company's requirements due to this re-organization is in hand.

Farming

The loss on farming amounted to R7,536 compared with a loss of R11,740 for the previous year. During January 1961 a gale which caused severe wind scarring considerably reduced the percentage of exportable citrus. The farming activities are still confined mainly to cattle and citrus.

General

Due to the sporadic distribution of gold in the Barberton area, and to ensure continuity of mining operations it is essential to intensify geological investigation and prospecting of dormant mines.

Capital expenditure will continue at a high rate for some time to come, both on shaft sinking at New Consort and Agnes mines, and on prospecting.

Frantzina's Rust Timber Plantations Limited

This company remains a 98.24 per cent. subsidiary of your company. In the circular to members attention was also drawn to the proposed reorganization of this subsidiary's operations. The sawmill has now been leased on a long-term basis to Barberton Sawmills (Pty.) Limited, which company has also taken cession of the Nelshoogte Government contract.

The sylvicultural work necessary to maintain the quality of the pine plantations and to cut gum for mining timber is being continued.

A loss of R134,017 was incurred for the year compared with a loss of R110,322 for the previous year. Working costs were abnormally high as they included the balance of R28,000 outstanding on the premium paid for the Nelshoogte Government sawlog contract and R21,299 bank interest on overdraft.

FREE STATE SAAIPLAAS GOLD MINING COMPANY LIMITED

The Sixth Annual General Meeting of the above mentioned Company will be held in Johannesburg on November 7. The following is an extract from the Statement to Members by the Chairman, **Mr. J. M. M. Ewing :—**

Milling operations were commenced early in the year. After trial milling for three months normal production began on January 1, 1961, at a rate of 50,000 tons per month, since when all expenditure on development has been charged to working costs. Steady progress has been made throughout the year on equipping the mine, and in June, 1961, the output reached 57,000 tons milled for the month. Working profits were earned from March 1961 onwards.

Development

While the rate of advance of development was again retarded by adverse geological features encountered underground, an important improvement was achieved in that the proportion of the total development which was on reef and sampled was raised to 30.2 per cent compared to 17.1 per cent recorded in the previous year.

The footage advanced amounted to 63,309 feet, in comparison with 37,576 feet for the preceding twelve months. The footage sampled on the Basal Reef totalled 19,115 feet, of which 13,365 feet, equal to 69.9 per cent, was payable at an average value of 6.2 dwt per ton over an estimated stoping width of 51.0 inches, equal to 316 inch-dwt. The work done was located mainly between the two shafts but cross-cuts on the 11th and 13th levels were advanced from No. 2 Shaft to obtain access as soon as possible to the Basal Reef to the west of that shaft.

Ore Reserve

The ore reserve fully developed at June 30, 1961, based on a pay limit calculated to conform to existing conditions in respect of gold price and working costs, was estimated to be 683,000 tons, averaging 5.2 dwt per ton over a stoping width of 50.6 inches, equivalent to 263 inch-dwt.

Outlook

The Company's mine is now equipped to operate on a production scale adequate to permit a working profit to be earned from the milling of ore of the average gold content and development payability as disclosed by development up to the present time. As already mentioned an additional R6 million was raised by the Company last year in order to equip the mine for production at a capacity of not less than 100,000 tons per month by March, 1962, details of the programme being set out in a Circular to Shareholders and Noteholders dated July 25, 1960. On the basis of this programme, it was estimated that the Company's existing indebtedness (Loans R7m and Notes approximately R2.4m) could be repaid before June 30, 1965, provided that the average gold yield had risen to 8.1 dwt per ton milled for the year ending June 30, 1963. On the information available at the time this programme was initiated, the Technical Advisers considered that an average yield in excess of 8.1 dwt per ton could reasonably be expected, in which event it appeared that dividend payments could commence before repayment of the Loans and Notes had been completed.

Subsequently, gold values obtained in development have not measured up to expectation. The average of all payable development disclosures up to June 30, 1961, was, as previously stated, 328 inch-dwt, an average that is unfortunately much below the Basal Reef values disclosed in surface boreholes L.R. 6 (average 697 inch-dwt) and L.R. 7 (average 1,533 inch-dwt). These boreholes lie immediately adjacent to the area that is at present being explored, and gave foundation for anticipation of higher average gold values than development has so far disclosed.

The Technical Advisers consider that the raising of the milling rate to 75,000 tons per month by January, 1962, will present no untoward problems, but that there appears to be little prospect of achieving an average yield higher than 5.5 dwt per ton milled until the south-western side of the mine is opened up. In the light of geological information now available, there are grounds for hoping that the gold content of the Basal Reef in this area will be higher and less erratic in deposition than in the areas so far developed. The crosscut on the 13th level is being advanced westwards as rapidly as possible to explore the south-western sector, but in view of the limited working profits now to be expected, the Technical Advisers have recommended that the rate of development for the mine as a whole should not exceed 6,000 feet per month when milling at 75,000 tons per month. Should values improve in development, this recommendation would require to be reconsidered. They point out also that, on the present indications of payability and value, they estimate a minimum of 7,000 feet per month would be required some years before the milling rate is increased to 100,000 tons per month, in order to build up the ore reserve sufficiently to be able to sustain milling at this higher level.

As members were recently notified, the Board of Directors consider it will be prudent not to incur expenditure on equipping the mine to raise the nominal productive capacity to 100,000 tons per month from the level of 75,000 tons per month currently being provided for, until the rate of development can be appropriately raised.

National Mining Corporation.—A final dividend of 2½ per cent has been recommended in respect of the year ended March 31, 1961. This brings the total for the year to 7½ per cent, the same as the previous year. The preliminary results for the year show that the consolidated profit after taxation has fallen from £62,759 to £41,796. The amount of written-off investments has increased from £15,130 to £19,488 whilst the transfer to general reserve has been reduced by £20,000. An interim dividend of 5 per cent has been declared in respect of the current year.

West Wit Areas Borehole.—The borehole E.8.L. on farm Kleinfontein has re-intersected the carbon leader reef at a depth of 9,085 feet assaying 5.7 dwts. over 7.8 inches; equivalent to 44 in.-dwt.

WITWATERSRAND NIGEL

MR. S. F. DENCH'S STATEMENT

The twenty-eighth ordinary general meeting of Witwatersrand Nigel Ltd., will be held on November 30, 1961, in Johannesburg. The following is the Statement of the Chairman, **Mr. S. F. Dench**, circulated with the Report and Accounts for the year ended June 30, 1961 :—

Tonnage milled during the year was 238,200 which was 11,300 tons higher than that for the previous year, but the yield again dropped and was 4.384 dwts. per ton which was 0.242 dwts. lower than last year. Working costs were reduced by 16 cents (1s. 7d.) per ton.

Development Results

The footage developed was 19,933 feet which was 1,414 feet less than the previous year. The overall percentage payability slightly increased to 28.7 per cent, giving an average value of 247.6 inch-dwts. Payability at Houtpoort, however, was very erratic and in that section it averaged only 19 per cent. At the Poortje section values were slightly lower, but this was offset by an increase in the channel width of 8 inches and in consequence, the inch-dwt. value was practically unchanged.

The estimated ore reserve at June 30, 1961, was 736,800 tons averaging 4.66 dwts. per ton over a stoping width of 37 inches. This represents a decrease of 34,000 tons with values and widths virtually unchanged. Of this ore reserve, 449,800 tons were located at the Poortje section.

At the Houtpoort section no new blocks were added to the ore reserve as a result of development. Delays, due to factors mentioned in my last year's review and to the intersection of large waterbearing fissures, were such that it has not yet been possible to complete a cut across the erosion channel feature on or below the twenty-third level. It is expected, however, that this will be achieved by the end of this year and then the final decision will be taken as to whether development should continue in this section. Up to the present there have been no indications to give encouragement to the view that further work will be worthwhile. Meanwhile, some progress is being made in the transfer of operations to the Poortje section and moderate capital expenditure will be incurred during the current year to provide for an increased milling rate there.

Profits and Dividend

The net profit for the year amounted to R109,383 (£54,692) as compared with R128,519 (£64,260) for the previous year. Profits for the current year are expected to be lower because of the need to complete the expensive development programme at the Houtpoort section and of the cost of the increasing development programme necessary at Poortje to ensure future ore reserves. Your company still has no liability for gold mining taxation. Capital expenditure during the period amounted R11,227 (£5,614), mainly in respect of haulage equipment. There was a recoupment of R4,062 (£2,031) in respect of a small area of surface expropriated by the South African Railways. Expenditure on capital account during the current year will continue to be at a very moderate level.

Dividend No. 7 of 4 per cent was declared payable to share-holders registered at June 30, 1961.

There was no change in the constitution of the Board of Directors during the year.

I have pleasure in expressing the Board's appreciation of the excellent services rendered during the past year by the Mine Manager, Mr. J. A. D. Wingfield, and I would also like to pay tribute to the efficient services rendered by the technical and administrative staffs at Head Office and the London Office, and the employees at the mine.

SOUTH ROODEPOORT MAIN REEF AREAS, LIMITED

(Incorporated in the Republic of South Africa)

The 27th Annual General Meeting of South Roodepoort Main Reef Areas, Ltd. will be held on November 14, in Johannesburg.

The following is an extract from the circulated statement of the Chairman, **Mr. C. S. McLean.**

In comparison with the previous year, working revenue improved by R21,857 due to an increase in recovery of 0.04 dwt. per ton milled and the slightly higher average price for gold received. It is noteworthy that this improvement was achieved in spite of a drop of 2,000 tons milled as the result of the underground explosion which occurred on February 17, 1951, to which I shall refer later. Non-mining revenue at R30,568 included the sum of R12,137 recovered from our insurers as representing the loss of profits and standing charges in consequence of this accident. Total revenue at R2,210,831 showed an improvement of R34,075, against which, however, working expenditure plus Directors' fees at R1,655,198 increased by R29,224. The total profit of R555,633 before taxation was R4,851 higher than the previous year's figure.

Capital expenditure amounted to R6,388 and taxation to R220,897. The rates of dividends declared over the previous four years at 22½ cents per share per annum were again maintained and absorbed R319,649. The balance of R8,699 remaining was added to the unappropriated profits brought forward, the total of which was R278,561 at the year end.

Of the development footage accomplished during the year, 10,295 feet were sampled of which 36.2% proved to be payable with an average value of 255 inch-dwt. Compared with the previous year these results showed a decrease in percentage of payability but with a slightly higher average value. I would reiterate, however, that in a mine such as this fluctuating results must be expected.

Compared with the previous estimate, the ore reserves at the year end of 1,095,000 tons averaging 4.8 dwt. over 47 inches decreased by 10,000 tons with a slight increase in value. No Kimberley Reef ore was included in these reserves.

Development on Kimberley Reef on the portion of our lease area on Vlakfontein No. 238 lying to the north of the Saxon Fault confirmed the results obtained from underground boreholes to which reference was made at the last Annual General Meeting. Of 1,220 feet sampled, 35.2% proved to be payable at a value of 4.23 dwt. per ton over a channel width of 50 inches.

Negotiations are in progress for the purpose of obtaining a Mining Lease over the remainder of the mineralized area of Portion "K" of the farm Rietvalei No. 241 in extent approximately 338 morgen. This area lies to the north of, and is adjacent to, Mynpacht No. 752 which was granted to the Company during the past year.

The supply of native labour throughout the year was once again adequate for the requirements of the mine.

MINING FINANCE—*Continued*

with the revenue from plant disposal, to return more than the London price of 4s. 6d. The original par value was R1 and therefore a further 65 cents can be returned tax-free with a final 2½ cents on liquidation.

LOWER COSTS AT WIT NIGEL

During the past year the mill grade has fallen by 0.24 dwt. at Wit Nigel and this has been accompanied by a fall in working costs of 16 cents per ton. This reduction in costs, however, is insufficient to offset the loss in revenue due to falling grade and the total profit for the year has fallen from R128,519 to R109,383.

The mine is divided into two sections, the Houtpoort and the Poortje. At the Houtpoort section no new blocks were added to the reserves during the year and, as indicated twelve months ago, it is doubtful whether further work in this section will be worthwhile. The final decision in this matter will be taken during the current year, but in the meanwhile some progress is being made in transferring operations to the Poortje section. This will involve a moderate capital expenditure in the current year but there is little reason to think that this will endanger the slightly reduced current dividend rate of 1 cent per share.

Italian Loan.—South Africa has received its first loan from an Italian institution. The loan, which is for three years at 5½ per cent, is for $10,000,000.

Ashanti Quarterly.—The estimated profit for the quarter was £450,027 bringing the total for the year to £1,859,753 compared with £1,738,957 for the previous year.